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Archives of PHYSICAL MEDICINE *and* REHABILITATION

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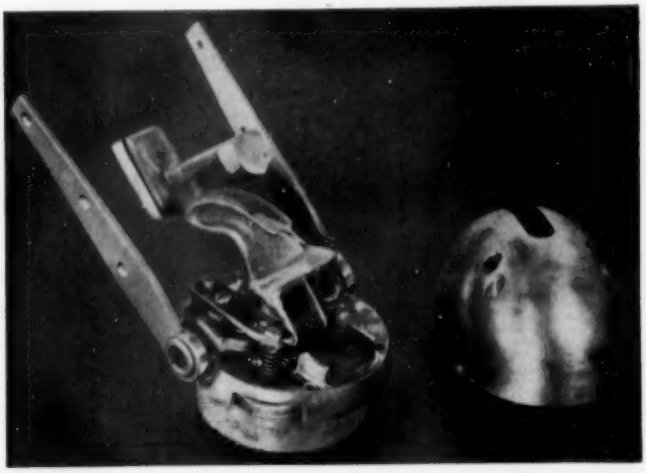

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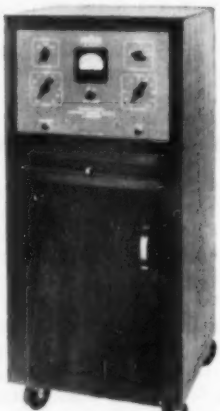

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Supportive Appliances in Rehabilitation of the Paralytic Hand

Odon F. von Werssowetz, M.D.
Rose M. Elliott, B.A., O.T.R.
Betty Riess, B.A., A.R.P.T.
and
R. N. Witt, C.O.
Gonzales, Texas

The primary deficiency in a paralytic hand is the loss of muscular power or balance. This is often associated with loss of elasticity of the soft tissues and skeletal malalignment. The basic principle underlying the use of supportive appliances in the rehabilitation of the paralytic hand is the restoration of functional capacity to the greatest degree within the optimal range of motion by providing protection to the weakened muscles, assistance to these muscles so that co-ordinated movement is possible, and prevention and correction of contractures and tightness.

Protection of the weakened muscles is the most important single criterion in treatment of early disabilities of the hands. Prolonged over-stretching of weak muscles leads to persistent deformities which are very resistant to correction. Prevention is simple and easily accomplished. In the early phase, affected muscles will require assistance to perform their part in co-ordinated motion. Reinforcement of weak muscle action by appropriate springs or elastics will encourage return of strength. Otherwise, the weak muscles, being unable to oppose the stronger pull of their antagonists, will assume the position of least resistance which will place the hand in a position of dysfunction.[1]

If contractures or tightness have developed then it will be necessary first to restore the mobility of the joints. This may be accomplished by manual stretching or mobilization. In some cases such methods may suffice; however, in the majority of cases, it is necessary to exert a steady prolonged force so that a gradual release of contractures occurs without traumatic complications. Special assistive supports, properly selected and adjusted for each individual will accomplish mobilization of the affected joint efficiently and almost painlessly in most cases.

The selection of the appropriate support depends on the complexity and pattern of muscular involvement and the amount of limitation of joint motion. Each device is individually selected. However, the following assistive supports were found to fit, with minor modifications, most of the paralytic disabilities of hand.

Conventional Simple Opponens Splint

The basic hand or conventional simple opponens splint restores to the hand the position of function and gives protection to weak muscle groups of the thumb. The plastic dowel or a web spreader should be of sufficient size to maintain adequate mobilization of the adductor pollicis muscle and should fit snugly into the web between the thumb and index finger. The distal metal band should hold the first metacarpal bone in a position for the thumb to oppose the fingers, thereby protecting the weak opponens and abductor muscles of the thumb.

This static opponens splint becomes partially dynamic by an addition of a hinge on the distal band on the radial side (fig. 1). An elastic band is attached

Read at the Thirty-second Annual Session of the American Congress of Physical Medicine and Rehabilitation, Washington, D.C., September 9, 1954.
Medical Director, Gonzales Warm Springs Foundation.
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to the part over the thumb and carried over the palmar surface to the other side. This conventional simple opponens splint with a hinge is used when mobility of the thumb is desired.

Rosenauer Thumb Assist

When the opponens pollicis is only partially involved and the rest of the hand is balanced, then a Rosenauer thumb assist (fig. 2) is used. It utilizes elastic tension to pull the thumb forward from the hand and into a position of opposition with the fingers. The leather wristlet has a half-circle metal band attached to it which has been molded to fit the ulnar side of the wrist. The tension and line of pull is adjusted in each individual case depending on the imbalance of the muscles of thumb.

A rubber covered piano-wire loop may be used with a simple opponens splint not utilizing the dowel. This method is employed, especially in children, to allow greater freedom of motion and yet provide support to the first metacarpal. The removal of the dowel permits better grasp and also encourages the function of the adductor pollicis muscle which appears to play a greater role in the function of the hand than is commonly realized.

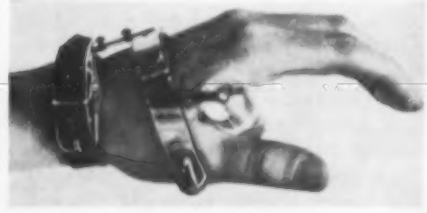

Fig. 1 — Dynamic simple opponens splint.

Fig. 2 — Rosenauer elastic thumb assist.

Supports are essential when there is weakness or deviation in the wrist. In some cases static supports may be sufficient. These supports stabilize the wrist in a position of slight dorsiflexion and do not permit mobility. However, during activity of the fingers, the wrist muscles undergo isometri ontractions and the effect is of setting-up exercise with increase in strength of these muscles.

Free Hinged Wrist Splint

When mobility of the wrist is required, then hinged supports are used. A free hinged wrist splint (fig. 3) is used when there is sufficient power in both flexion and extension, but muscle imbalance or deviation of the wrist is present. This splint which is a modification of the basic opponens splint has the proximal carpal bar crescent shaped. This bar articulates with forearm side bars. The axis of the artificial joint must be placed in line with the axis of the wrist joint, otherwise, the splint will ride forward or backward. This will interfere with function and cause irritation of the skin.

If a hand, otherwise functional, has a tendency to assume a palmar flexed position, stops can be used to limit this motion (fig. 4). It is found that some patients are more functional when they are allowed about ten degrees of palmar flexion. With the hand in such position, these patients are able to pick up small objects such as pins, etc., which they cannot do when the hand is held in the standard position of function.

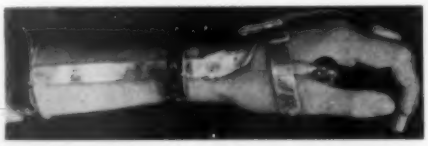

Fig. 3 — Free hinged wrist splint with hinged opponens bar with a dowel and a Lumbrical bar.

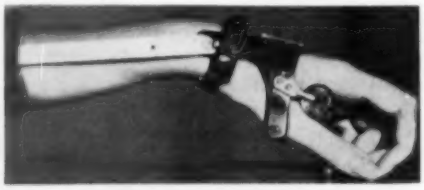

Fig. 4 — Wrist splint with a palmar stop to prevent excessive palmar flexion, attached to a simple opponens splint.

Spring Supports

Spring supports are required when there is weakness in the extensors of the wrist. The selection of the type of supports and the degree of tension of the spring or springs depends on several factors, such as the ratio between all the flexor and extensor muscles acting on the wrist joint, the weight of the support, the usual activities to be performed and the position during such activities. There are several types of these splints, one of which is the Oppenheimer hand splint. However, we found that a single action spring joint (fig. 5) in which the tension of the spring can be easily adjusted, is much more efficient. With this support, the tension of the spring is adjusted individually by clinical observations. A functional range of wrist motion is permitted by these supports.

The Lumbrical bar is added when there is weakness in lumbrical action. When this weakness is evident, the action of the finger extensors will hyperextend the metacarpo-phalangeal joints with incomplete extension of the interphalangeal joints which remain partially flexed. When flexion of the fingers is attempted, it occurs first in the distal interphalangeal joint and is followed by

Fig. 5 — Single action spring hinge wrist splint assisting weak wrist extensors.

flexion of the proximal joint. This flexed position of the distal part of the fingers produces a typical disability which interferes with a functional grip. The patient can only pinch with the tip of the thumb pushed against the index finger in a flat hand position. The addition of the lumbrical bar, affording slight flexion at the metacarpo-phalangeal joints, provides for complete extension of the interphalangeal joints and makes the grip functional. This position of hand has a tendency to promote gain of strength of the lumbrical muscles since it places them in a position of rest. The interosseous muscles assist the lumbricales in this action.

Great care should be exercised in selecting and adjusting springs or elastics, so that by their tension, optimal balance is obtained enabling the weak muscle group to participate actively. Therefore, springs have to be selected individually for each muscle group. We have found that the Hunter Negator Springs (Hunter Spring Co., Negator Division, Lansdale, Pa.) are excellent for this purpose. These springs are manufactured in a wide variety of sizes and tensions. The small sizes varying in tensile strength from one to six ounces are used for thumb or finger extension assists (fig. 6).

Fig. 6 — Hunter Negator Spring Assist for weakness of first dorsal interosseus muscle, attached to a simple opponens splint.

Their compactness and constant force, regardless of the amount of elongation or deflection of pull, gives them an advantage over rubber elastics. The free end of the spring is attached to a leather cuff encircling the digit and the coil runs freely over a small spindle fastened to the support. These springs exert their pull in the longitudinal axis of the digits in the same parallel plane as the muscles. This direction of pull approximates more closely the normal physiological force exerted by muscles and tendons.

The Hunter spring is particularly useful in providing assistance to a weak extensor longus of the thumb, because it is not bulky, and does not interfere with functional activities.

When using the Hunter Negators to assist extension of the fingers, the leather cuff to which the free end of the spring is attached, is placed on the dorsum of either the distal or middle phalanx depending on the relative strength of the

flexor profundus and sublimis muscles. This assist allows the patient to make use of whatever functional grasp he has by giving him the necessary power of release.

Hunter springs are also used in providing assists to weak or paralyzed first interosseous muscle. This is especially indicated when functional activities are attempted. The springs do not prohibit functional activity because they adhere closely to the skin surface and adjust themselves to the contour of hand with ease.

In cases with bi-lateral involvement of hands it is important to provide assists which will have the optimal grip for the individual patient. There are three basic hand holds. The grasp, such as holding a hammer; the hook, such as holding a bucket by fingers, and the pinch. There are three types of pinches. The finger tip prehension, which shows strongly arched fingers, is commonly used to pick up small objects such as pins or nails. It is unstable for holding medium size objects most commonly used in daily activities.

The lateral or sidewise prehension is accomplished by the thumb clamping against the side of the proximal interphalangeal joint, or the medial phalanx. This type is used for quick gripping. It has a limited range of motion.

The preferred grip is the palmar prehension which provides a greater gripping surface because it brings into use the palmar pads of the thumb and the two adjacent digits—that is the index and long fingers. It gives a secure grip. In this grip, the thumb is fairly straight and the fingers show a gentle flexion. It has a wide range of finger motion to take care of different sizes of objects.

The palmar prehension principle has been used in the functional assist for flail hand.[8] It is composed of a terminal device, a supporting cuff and a transmission mechanism (fig. 7). The terminal device consists of a metal bar fitted to the side of the hand and thumb as one prong, and articulating, as a pincer with another bar for the index and middle finger. This is individually prescribed,

Fig. 7 — Functional hand assist.

since some patients prefer all fingers incorporated in a flail hand device. This apparatus restores prehension which is dependent on the ability of the hand to assume the position of function; that is upon extension and flexion of the digits at the metacarpophalangeal joints for grip. The prehension attitude of the fingers in meeting the thumb is so arranged that it permits the patient the most comprehensive and universal approach to objects of various shapes and sizes, yet provides a secure grip. The terminal device is attached by an extension of the thumb bar to the forearm cuff. This provides the necessary stability. The assist is closed by elastics or springs, and opened by an active force transmitted from a harness through a steel cable which is attached to the finger prong. The motive force may be derived from either shoulder or lower extremity. Figure 8 illustrates how the lower extremity is used to operate this device. This patient who could not perform any activity at all is now able to accomplish a number of activities of daily living, namely eating, writing, brushing teeth, etc. She is also able to participate in certain recreational activities such as playing cards and dominoes[8].

Conclusion

It is obvious that hand splints, especially in a patient with permanent disability, must provide the optimal position

Fig. 8 — Patient activating the functional hand assist by her lower extremity.

for grip. This depends not only on the remaining muscle power and functional ability of the patient, but on the possibility of vocational rehabilitation as well. Many other factors have to be considered in selecting assistive appliances for hands. In evaluating the needs of the patient, which has to be done individually, consideration should be given to the total involvement, duration of the disability, amount and severity of contractures and to the general intelligence and psychological behavior of the person concerned. Once all these factors are evaluated in proper light and an adequate appliance is provided, then the rehabilitation of the patient progresses much faster and with better results.

Summary

The various types of supportive assists developed and used at the Gonzales Warm Springs Foundation Rehabilitation Center have been described. Emphasis has been placed on providing functional assists whenever possible. The so-called position of function is used in assists during early phases of treatment; however when the patient reaches functional activities training, the assists are re-evaluated and the patient is provided with an appliance which is best suited for his needs. Often these appliances are positioned between five degrees of dorsiflexion to ten degrees of palmarflexion. In these positions the hand is able to perform more activities of daily living than when the wrist is placed in twenty to thirty degrees of dorsiflexion. Each case has to be evaluated individually, and great care should be exercised in selecting and prescribing an assist for the hand. It is also apparent that close supervision is necessary in the training in the use of such assistive apparatus, and frequent re-examinations are required to ascertain its efficiency. As the disability improves the apparatus should be modified to meet the needs. It should never be more extensive than necessary. This is especially true when springs or elastics are used because it is important to establish and maintain optimal balance between the strength of the weakened muscles and their assists.

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Elastic Splints for Patients with Paralysis of the Lower Extremities

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Introduction

The usual treatment of patients with paralysis of one or both legs after poliomyelitis or other paralyzing diseases is the application of metal braces. Such braces are heavy, expensive, and interfere with sitting as well as disrupt the normal walking pattern. In patients with spasticity, a favorable effect has been recently obtained by employment of elastic splints — the so-called "twisters." Because of their elasticity these splints assist desired motion and counteract the unfavorable tendency to formation of contractures.

Late in 1953, a young French medical student (P.H.D.) was admitted to the Blegdam Hospital for paralysis of the lower extremities, involving the gluteus maximus and medius, quadriceps and tibialis anterior on both sides although the involvement was more pronounced on the right. He had strength in the abdominal, erector spinae, and iliopsoas muscles. Because metal braces interfered with movement, especially on the right side, he and his physical therapist (T.L.) felt it would be worthwhile to try to construct a light elastic "twister" system to assist active motion.

Construction

After several attempts, the apparatus maker of the Blegdam Hospital (F.L.) designed an elastic splint to assist patients with paralysis of the hip, knee and ankle extensors if trunk musculature and hip flexors are good.

The elastic splint is made up of two flat elastic bands 3 cm. in width, both of which are attached to a broad chamois-lined leather belt having metal stays (fig. 1). These elastic bands diverge over the buttock (fig. 2), continue down around the thigh on either side, cross over the anterior aspect of the patella and terminate at a cuff with metal stays on the posterior aspect of the leg. Here the elastic bands are fastened by means of two snap-hooks, allowing the tight elastic bands to be easily detached when the patient sits down (fig. 3). From the distal cuff on the leg a pair of detachable rubber cords, 6 mm. in diameter, extend down to the shoe to replace the extensors of the foot.

Fig. 1 — Elastic splint to provide active hip, knee and ankle extension.

From the Epidemic Department and Clinic of Physical Medicine and Rehabilitation, The Blegdam Hospital.

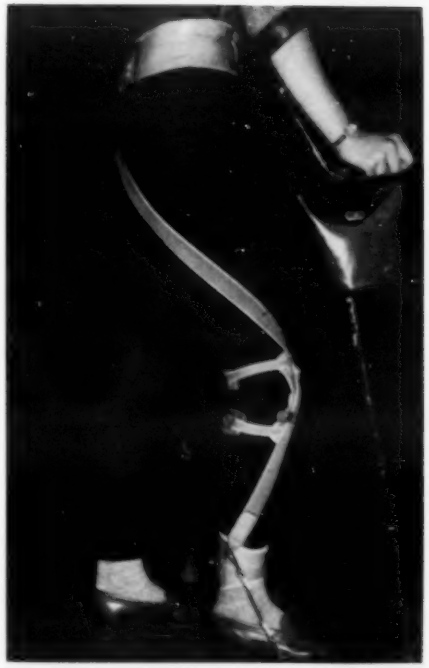

Fig. 2 — Elastic splint assists locking of hip and knee during standing and walking. Hip flexors must be present to overcome the resistance of this splint.

Fig. 3 — Elastic cables assist dorsiflexion of the ankle. Snap hooks allow the straps to be disconnected easily when patients are sitting. The shin cuff is reinforced with steel stays to prevent curling.

Fig. 4 — Elastic "gluteus maximus" straps used with a long leg brace.

The metal stays in the belt and cuff prevent the leather belt from curling and avoid the necessity for excessive tightening around the leg that might result in circulatory disturbances and edema.

The elastic splint has the following advantageous features: Lightness, ease of adjustment and repair, economy, and excellent adaptability. It is possible to begin walking exercises early with this splint. It locks the knee and hip during walking; promotes muscle tone, and is easily loosened while sitting.

Such an elastic splint can be used if the other leg is normal, or, if it be markedly paralyzed, it should be fixed by means of a metal brace (Warm Springs model). There must be no tendency to overextension of the knee of the extremity to which the elastic bandage is applied.

In the preliminary experiments it was also found that the attachment to a long leg brace of elastic traction corresponding to the gluteus maximus lessened the weight of the brace (fig. 4). It became much easier for the patient to keep his balance, on sitting as well as walking, and it helped to direct the leg when it was put forward during exercise. Moreover it was made detachable, corresponding to the "knee-joint," so that the patient could readily loosen the traction when he wanted to sit down.

Summary

It has proved practicable to make a light, inexpensive elastic splint for patients with paralysis of a lower extremity. It is easy for the patient to use and is simple to detach for sitting or to attach for standing.

Effect of Piromen on Spasticity in Cases of Spinal Cord Injury

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Introduction

Spasticity poses a frequent and serious problem in many patients with spinal cord injury. Conservative and operative methods have been developed to alleviate spasticity which at times may become so pronounced as to interfere not only with physical rehabilitation but even with life. It is quite well known that many factors such as bedsores, urinary infections, bowel constipation precipitate spasticity as well as many other conditions not necessarily related to the spinal cord injury.[1-4]

Because of one or more of these reasons, it was decided to try Piromen in fourteen cases to learn if the severity of spasticity could be decreased. Because of various fluctuating factors which influence spasticity it is difficult to evaluate the degree of spasticity. If a drug reduced spasticity of patients with incomplete lesions the remaining voluntary motor function, obscured by spasticity, could possibly be utilized. Although the mechanism of spasticity following spinal cord injury is not yet understood, Piromen was chosen because its properties—as tested in animal experiments—consist of some regeneration of the spinal cord, prevention of massive gliosis and good vasculorization.[5-7]

Materials and Methods

Twelve patients with traumatic myelopathy, one with extradural pressure from abscess and one with multiple sclerosis were studied. Cervical lesions were evident in nine cases and thoracic lesions were present in five cases. One cervical and one thoracic lesion were clinically complete and twelve were incomplete. Piromen therapy was started from four months to approximately eleven years after injury or onset of disease.

The onset of spasticity after injury averaged two months and the speed with which it developed varied from a few days to a matter of months. The degree of spasticity was roughly estimated as one to four plus. In all cases adequate conservative measures were taken which are known to decrease spasticity by fatigue, heat and stretching.

The following method was used for recording the spasticity of the lower extremities. An eight channel Grass electromyograph recorder was used. Fine 28 gauge platinum wire needle electrodes, 1.25 cm. in length, were inserted into the superficial aspects of the muscles. Lead #1 was placed in the left quadriceps femoris; lead #2 in the left hamstrings; lead #3 in the left tibialis anticus muscle; lead #4 in the left gastrocnemius muscle; lead #5 in the right quadriceps femoris; lead #6 in the right hamstrings; lead #7 in the right tibialis anticus, and lead #8 in the right gastrocnemius muscle. The dorsum of the right foot was used as the ground.

The first tracing was done at complete rest in order to obtain a baseline for future observations. The patient was supine on a wheeled litter with his knees restrained by a padded belt. He was then instructed to close his eyes, to breathe deeply and slowly through the mouth with the jaw relaxed, and to allow the trunk and extremities to sink into the mattress as much as possible.

After this, various stimuli were used to evoke spasticity in the lower extremities. These stimuli were chosen to simulate events encountered in daily life such as rubbing of a shirt or sheet on the chest; abdominal massage to aid bowel function; pressure to the abdomen from prone position; pinching of the pubic

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region from G. U. appliances; stimuli to the sole of the foot from stockings or shoes, etc. Stimuli used were stroking of the anterior chest across the line of the nipples; stroking of the abdomen in a clockwise fashion; slapping of the abdomen over the region of the umbilicus; pinching of the midline of the abdomen at a level of T-10, 11 and 12; pulling the pubic hair; slapping of the antero-lateral aspects of each mid-thigh at a level of L-1, 2 and 3; slapping of the antero-lateral aspect of the lower third of each leg at a level of L-3, 4 and 5; and performing Babinski tests bilaterally.

Stroking of the abdomen or the sole of the foot was found to evoke spasticity reliably and was therefore used as a standard for comparison of results before and after the use of Piromen.

Piromen was given intravenously three times weekly, starting with one gamma and increasing each dose by one gamma up to ten, eleven or twelve gammas. After three weeks of intravenous treatments, the tracings were repeated. The patients were then given intramuscular injections of five to ten gammas three to five times weekly and after eleven to twelve weeks of treatment, the tracings were again repeated. Temperature recordings were routinely made at intervals of thirty and sixty minutes following each intravenous injection. Temperatures were taken at four-hour intervals following each intramuscular injection.

No change of treatments in physical medicine therapy was made during Piromen application, and the same daily routine was maintained. Intervening complications unrelated to the use of Piromen were noted and recorded.

Results

The results of this investigation are shown in table 1. Therapeutic doses, administered intravenously and intramuscularly, over approximately three months resulted in no improvement in eight patients who had reached a static stage of spasticity. The one case of multiple sclerosis in which the drug was tried experienced increased spasticity, increased weakness and markedly severe drowsiness following the injections. Because the patient was definitely worse, the treatment was discontinued after the ninth intravenous injection. In five patients who had incomplete lesions and who were spontaneously improving in voluntary return, the decrease in spasticity which occurred was attributed to spontaneous improvement in the conduction of the remaining spinal cord tracts rather than to any effect of the Piromen therapy. In our experience, their clinical course was not any better than that of many patients we have treated without the use of Piromen.

Table 1: Results of Study

Neurological level	Complete or Incomplete	Severity of Spasticity at Start of Piromen	Results
C-4 to 5	incomplete	two plus	no change
C-4 to 6	incomplete	four plus	no change
C-5	incomplete	two plus	one plus (spontaneous)
C-5	incomplete	three plus	no change
C-5	incomplete	two plus	one plus (spontaneous)
C-6	incomplete	three plus	no change
C-6	incomplete	four plus	no change
C-7	complete	four plus	no change
T-3	incomplete	four plus	three plus (spontaneous)
T-3 to 5	incomplete	four plus	three plus (spontaneous)
T-4	incomplete	three plus	no change
T-6	complete	three plus	no change
T-7 to 8	incomplete	three plus	two plus (spontaneous)
Multiple Sclerosis	incomplete	four plus	worse

Figure 1 shows the electromyographic tracings taken before starting Piromen, after its intravenous administration, and after its intramuscular administration. The electromyographic tracings demonstrated that the amount of relaxation in the lower extremities was often of different degree on opposite sides; that spastic response was quickest with stim-

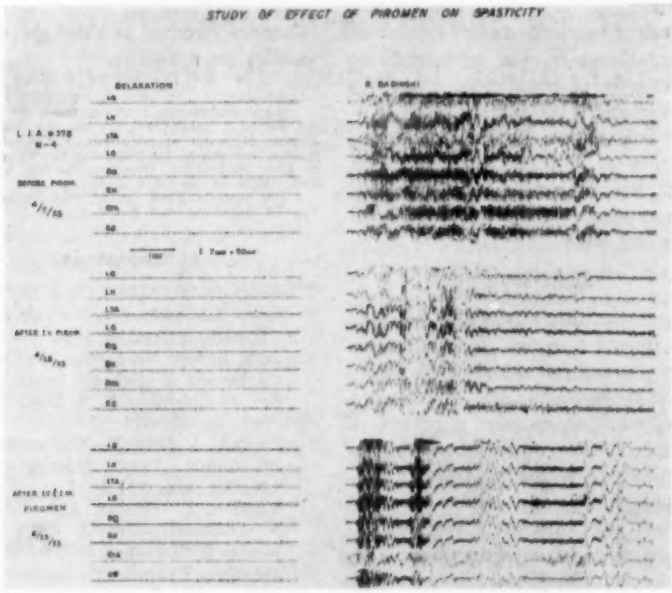

Fig. 1—The left side of illustration demonstrates the amount of relaxation. The right side shows the spasticity induced by stroking sole of right foot. Note the various asynchronous types of contractions induced.

ulation of the soles of the feet or stroking of the abdomen and that it was also of greatest magnitude; that in some cases the spasticity consisted of synchronous contractions and inhibitions and that it was asynchronous in other cases,[9] and finally that spasticity was dependent to a small degree upon respiration.

Discussion

This method of recording spasticity in the lower extremities by use of electromyographic tracings afforded an objective record before, during, and after therapy. It was difficult to decide arbitrarily upon the dosage of Piromen. An attempt was made to prohibit occurrence of a high fever by intravenous medication but at the same time produce a fever of about 100 F., or a rise of one to two degrees above the average daily baseline of body temperature. The side effects from the intravenous administration consisted of various predominantly subjective symptoms, namely flushing of the face; drowsiness; vertigo; dyspnea; burning sensation at the urethral meatus; increased rectal sensation; feverish and chilly sensation; chills; increased sweating in the lower extremities; nausea; tinnitus; headache; soreness over dome of bladder; increased pain across the chest; increased pain at the site of a former laminectomy; feeling of relaxation in the lower extremities, and a feeling of having had more rest during sleep.

In administering the intramuscular injections none of these symptoms were noted on any occasion. This was probably due to the magnitude of the intramuscular dosage, which in order to equal the intravenous dosage, would have had to have been multiplied many times.

Although following the intravenous administration of Piromen there was usually a temperature rise of one to two degrees, on a few occasions a fall in temperature was noted. This fall ranged from one-tenth degree to as much as two degrees. When chills occurred following the intravenous administration, a rise of three or four degrees usually followed. After such undesirable rise the next intravenous dose was reduced in order to prevent repetition of this reaction. The temperature curves following the in-

tramuscular injections did not markedly differ from those seen daily in cases of this type. However, the intramuscular injections were of insufficient dosage to cause fever and vaso-dilatation. In contradistinction to that, the intravenous administration of Piromen had its effect as demonstrated by the increase in temperature, flushing of the face, increased sweating and chills.

Summary

Piromen was administered to fourteen patients in order to test its effect upon spasticity caused by spinal cord injury or disease. Intravenous and intramuscular doses were given over a period of approximately three months. An objective method of recording spasticity by electromyography was used. The evidence suggested that there was no improvement in eight patients whose spasticity was stationary. In five patients with incomplete lesions who improved clinically before and during treatment, the improvement was not thought to be greater than in many other comparable cases not treated with Piromen. The improvement was considered to be spontaneous and compatible with the extent of the lesion. In the single case of multiple sclerosis in which the drug was tried, the patient became worse and the drug had to be discontinued. The experience gained from this investigation is not encouraging regarding the usefulness of Piromen as a therapeutic agent to alleviate spasticity.

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An Instrument and Technic for the Measurement of Range of Joint Motion

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Introduction

One element of body movement, namely, the range of rotations or angular movement of different body segments, has been the subject of considerable interest, some experimentation, and much speculation in recent years. The extent to which the forearm may move by rotation on the elbow as an axis, and the extent to which the head may rotate about the various joints in the neck providing for that movement, are two examples of such movement. Movement of any body segment with respect to another segment is almost universal in some form for all parts of the body. The potential and existing ranges of such movement have come to be called "flexibility" of the body and of its various parts. Common practice has established the use of the term with reference to *range of movement* only, although by its nature the term might apply to many other factors of movement such as muscle viscosity.

The medical and therapeutic interests in flexibility and its computation have led to attempts at measurement, to the development of many measuring devices, and in general have laid some foundation for a scientific approach to the field. The general status of flexibility measurement, as it applies to this medical and therapeutic interest, has been summarized by Wiechec and Krusen[1] who bring to attention most of the problems involved in measuring flexibility primarily from a medicolegal point of view. They indicate specialized needs from their point of view but also illustrate well such problems as methods of measurement, the need for a recognized common nomenclature and definition of terms, the need for clear definition of the movements to be measured, and the need for establishment of norms and of measures of range of motion.

Although there has been a considerable expansion of interest in the area of physical rehabilitation since the close of World War II as evidenced by the addition to the practice of medicine of the specialty physical medicine and rehabilitation, the aspect of flexibility measurement has not progressed much beyond its status at the time of the Wiechec and Krusen report. The needs are still present.

In attacking the problem of flexibility or range of joint motion as evidenced by normal individuals of various age levels and various activity specialties, an instrument and technic have been devised. The instrument and technic have met the criteria of validity, objectivity and reliability in that:

1. All movements measured corresponded to the recognized segmental movements of the body.
2. A correlation coefficient between a first and second measurement was derived for each of the thirty measures recorded. These coefficients of correlation for 120 boys ranged between .913 and .996, sufficiently high for individual comparisons.
3. All measures were recorded in degrees of a circle.
4. The flexibility measures of two different groups of 16 year old boys, widely separated as to geographical location and measured by different investigators, were compared for similarity. The comparison was made between the means on similar measures for the two groups. The significance of the existing differences between the means was found by determining the t value for these dif-

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ferences; the null hypothesis being rejected at the 5 per cent level. Of the 29 measures, 27 showed no significant differences. Their *t* values ranged between t = .00 and t = .99. Only 2 measures, neck lateral flexion and trunk rotation displayed significant differences, t = 4.32 and t = 3.50. There is evidence here of two things: These two groups of 16 year old boys have similar flexibility abilities, and this system of measurement was sufficiently objective and reliable to show these similarities when each group was measured by a different individual.

The Instrument

The instrument consists of a weighted 360 degree dial and a weighted pointer mounted in a case. The dial and pointer operate freely and independently; the movement of each is controlled by gravity. The instrument will record movement while in any position which is 20 degrees or more off the horizontal. The zero mark on the dial and the tip of the pointer move freely to a position of rest and coincide when the instrument is placed in any position off the horizontal as indicated. Independent locking devices are provided for the pointer and the dial which stop all movement of either at any given position. In using the instrument, the flexometer is strapped to the segment being tested. The dial is locked at one extreme position (i. e., full flexion of the elbow); the movement is made and the pointer locked at the other extreme position (i. e., full extension of the elbow). Then the direct reading of the pointer on the dial is the arc through which the movement has taken place. The instrument has been titled the "Leighton Flexometer."

Measurement Technic

Neck

Flexion and Extension: *Starting Position*—Supine position on bench, head and neck projecting over end, shoulders touching edge, arms at sides. Instrument fastened to either side of head over ear.

Movement—Count (1) head raised and moved to position as near chest as possible, dial locked (2) head lowered and moved to position as near end of bench as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Shoulders may not be raised from bench during flexion, nor back unduly arched during extension. Buttocks and shoulders must remain on bench during movement.

Lateral Flexion: *Starting Position*—Sitting position in low-backed armchair, back straight, hands grasping chair arms, upper arms hooked over back of chair. Instrument fastened to back of head.

Movement—Count (1) head moved in arc sideward left as far as possible, dial locked (2) head moved in arc sideward right as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Position in chair may not be changed during movement. Shoulders may not be raised or lowered.

Rotation: *Starting Position* — Supine position on bench, head and neck projecting over, shoulders touching edge and arms at sides of bench. Instrument fastened to top of head.

Movement—Count (1) head turned left as far as possible, dial locked (2) head turned right as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Shoulders may not be raised from bench.

Shoulder

Flexion and Extension: *Starting Position*—Standing position at projecting corner of wall, arm to be measured extending just beyond projecting corner, arms at sides, back to wall, shoulder blades, buttocks and heels touching wall. Instrument fastened to side of upper arm.

Movement—Count (1) arm moved forward and upward in an arc as far as possible, palm of hand sliding against wall, dial locked (2) arm moved down-

ward and backward in an arc as far as possible, palm of hand sliding against wall, pointer locked (3) subject relaxes, reading taken.

Caution—Heels, buttocks and shoulders must touch wall at all times during movement. Elbow of arm being measured must be kept straight. Palm of hand of arm being measured must be against wall when dial and pointer are locked.

Adduction and Abduction: *Starting Position*—Standing position with arms at sides, left (right) side of body towards wall, shoulder touching same, left (right) fist doubled with knuckles forward, thumb-side of fist touching hip and opposite side of fist touching wall, feet together, knees and elbows straight. Instrument fastened to back of right (left) upper arm.

Movement—Count (1) palm of right (left) hand pressed against side of leg, dial locked (2) arm moved sideward, outward and upward in an arc as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Left (right) fist must be kept in contact with the body and wall at all times. Knees, body and elbows must be kept straight throughout movement. Arm must be raised directly sideward, not forward or backward. Heels of feet may not be raised from floor.

Rotation: *Starting Position*—Standing position at projecting corner of wall, arm to be measured extended sideward and bent to right angle at elbow, shoulder extended just beyond projecting corner, opposite arm at side of body, back to wall, shoulder blades, buttocks and heels touching wall. Instrument fastened to side of forearm.

Movement—Count (1) forearm moved downward and backward in an arc as far as possible, dial locked (2) forearm moved forward, upward and backward in arc as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Upper arm being measured must be held directly sideward and parallel with the floor during movement. Heels, buttocks, and shoulders must touch wall at all times.

Elbow

Flexion and Extension: *Starting Position*—Squatting or sitting position facing table or bench with upper portion of arm being measured resting back down across nearest table corner so that the elbow extends just beyond one edge and the armpit is resting against the adjacent edge. Instrument fastened to back of wrist.

Movement—Count (1) wrist moved

Fig. 1

upward and backward in an arc to position as near shoulder as possible, dial locked (2) wrist moved forward and downward until arm is forcibly extended, pointer locked (3) subject relaxes, reading taken.

Caution—Upper arm may not be tilted or moved during measurement.

Radial-Ulnar

Supination and Pronation: *Starting Position*—Sitting position in standard armchair, back straight, forearms resting on chair arms, fists doubled and extended beyond ends of chair arms, wrist of arm to be measured held straight. Strap is grasped in hand, fastening instrument to front of fist. (Common chair and table of suitable height may be substituted for armchair.)

Fig. 2

Movement—Count (1) thumb-side of fist turned outward and downward as far as possible, dial locked (2) thumb-side of fist turned upward, downward and inward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Body and forearm must remain stationary, except for specified movement, throughout measurement. No leaning of the body may be permitted.

Fig. 3

Fig. 4

Wrist

Flexion and Extension: *Starting Position*—Sitting position in standard armchair, back straight, forearms resting on chair arms, fists doubled and extended beyond ends of chair arms, palm of hand to be measured turned up. Instrument fastened to thumb-side of fist. (Common chair and table of suitable height may be substituted for armchair.)

Movement—Count (1) fist moved upward and backward in an arc as far as possible, dial locked (2) fist moved forward, downward and backward in an arc as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Forearm may not be raised from chair arm during movement.

Ulnar and Radial Flexion: *Starting Position*—Sitting position in standard armchair, back straight, forearms resting on chair arms, fists doubled and extended beyond ends of chair arms, thumbside of hand to be measured turned up. Instrument fastened to back of hand. (Common chair and table of suitable height may be substituted for armchair.)

Movement—Count (1) fist moved upward and backward in an arc as far as possible, dial locked (2) fist moved downward and backward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Forearm may not be raised from chair arm during movement. Fist may not be turned inward or outward during measurement.

Hip

Extension and Flexion: *Starting Position*—Standing position, feet together, knees stiff, arms extended above head, hands clasped with palms up. Instrument fastened to either side of hip at height of umbilicus.

Movement—Count (1) bend backward as far as possible, dial locked (2) bent forward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Knees may not be bent but must remain straight throughout movement. Feet may not be shifted. Toes and heels may not be raised.

Adduction and Abduction: *Starting Position*—Standing position, feet together, knees straight, arms at sides. Instrument fastened to back of either leg.

Movement—Count (1) starting position, dial locked (2) leg to which instrument is not attached is moved sideward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Body must remain in upright position throughout movement. Knees must be kept straight with the feet assuming a position on line and parallel.

Fig. 5

Rotation: *Starting Position*—Sitting position on bench with left (right) leg resting on and foot projecting over end of bench, knee straight, right (left) leg extending downward, foot resting on floor. Instrument fastened to bottom of left (right) foot.

Movement—Count (1) left (right) foot turned outward as far as possible, dial locked (2) left (right) foot turned inward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Knee and ankle joints must remain locked throughout movement. Position of hips may not be changed during measurement.

Knee

Flexion and Extension: *Starting Position*—Prone position on box or bench with knees at end of and lower legs extending beyond end of bench, arms at sides of and hands grasping edges of bench. Instrument fastened to outside of either ankle.

Movement—Count (1) foot moved upward and backward in an arc to position as near buttocks as possible, dial locked (2) foot moved forward and downward until leg is forcibly extended, pointer locked (3) subject relaxes, reading taken.

Caution—Position of upper leg may be changed during movement.

Ankle

Flexion and Extension: *Starting Position*—Sitting position on bench with left (right) leg resting on and foot projecting over end of bench, knee straight, right (left) leg extending downward, foot resting on floor. Instrument fastened to inside of left (right) foot.

Movement—Count (1) left (right) foot turned downward as far as possible, dial locked (2) left (right) foot turned upward and toward the knee as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Knee of leg being measured must be kept straight throughout movement. No sideward turning of the foot may be allowed.

Inversion and Eversion: *Starting Position*—Sitting on end of bench, knees

Fig. 6

projecting over and lower legs downward with calves resting against end board. Shoes (low cut) should be worn. Instrument fastened to front of foot.

Movement—Count (1) foot turned inward as far as possible, dial locked (2) foot turned outward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Position of lower leg may not be changed during measurement.

Trunk

Extension and Flexion: *Starting Position*—Standing position, feet together, knees straight, arms extended above head, hands clasped with palms up. Instrument fastened to either side of chest just below armpit at nipple height.

Movement—Count (1) bend backward as far as possible, dial locked (2) bend forward as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Knees must be kept straight throughout movement. Feet may not be shifted. Toes and heels may not be raised from floor.

Notation—This movement involves trunk and hip extension and flexion. To obtain the measure for trunk extension and flexion alone, the measure for hip extension and flexion must be subtracted from the score obtained above.

Lateral Flexion: *Starting Position*—Standing position, feet together, knees straight, arms at sides. Instrument fastened to middle of back at nipple height.

Movement—Count (1) bend sidewards to the left as far as possible, dial locked (2) bend sidewards to the right as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Both feet must remain flat on floor, heels may not be raised during measurement. Knees must be kept straight throughout movement. Subject may bend sidewards and backwards but must not be allowed to bend forward.

Rotation: *Starting Position*—Supine position on bench, legs together, knees raised above hips, lower legs parallel to bench and body. Assistant holds subject's shoulders. Instrument fastened to middle rear of upper legs, strap going around both legs.

Movement—Count (1) knees lowered to the left as far as possible, dial locked (2) knees brought back to starting posi-

Table 1: Flexibility Means and Standard Deviations for a Group of Forty 16 year old Oregon Boys

	Test	M	σ
1.	Neck flexion-extension	121.85	11.38
2.	Neck lateral flexion	78.63	10.38
3.	Next rotation	157.25	12.39
4.	Right Shoulder flexion-extension	256.75	10.95
5.	Left Shoulder flexion-extension	257.00	9.93
6.	Right Shoulder adduction-abduction	173.25	10.68
7.	Left Shoulder adduction-abduction	172.50	10.97
8.	Right Shoulder rotation	169.89	15.99
9.	Left Shoulder rotation	170.89	16.24
10.	Right Elbow flexion-extension	140.55	6.74
11.	Left Elbow flexion-extension	142.65	6.18
12.	Right Radial-Ulnar supination-pronation	160.38	12.65
13.	Left Radial-Ulnar supination-pronation	160.92	11.06
14.	Right Wrist flexion-extension	129.00	15.66
15.	Left Wrist flexion-extension	131.25	15.17
16.	Right Wrist Ulnar-Radial flexion	74.55	8.71
17.	Left Wrist Ulnar-Radial flexion	75.23	8.57
18.	Hip extension-flexion	54.03	13.37
19.	Hip adduction-abduction	81.68	8.01
20.	Right Hip rotation	69.00	13.73
21.	Left Hip rotation	70.50	14.98
22.	Right Knee flexion-extension	137.93	11.46
23.	Left Knee flexion-extension	137.78	10.42
24.	Right Ankle flexion-extension	63.63	10.32
25.	Left Ankle flexion-extension	63.58	8.90
26.	Right Ankle inversion-eversion	44.70	7.06
27.	Left Ankle inversion-eversion	45.28	7.99
28.	Trunk extension-flexion	78.50	21.38
29.	Trunk lateral flexion	96.63	10.16
30.	Trunk rotation	136.08	10.34

Note: All means and standard deviations are computed in degrees and fractions of degrees. The symbol (°) for degree is omitted since no other unit of measure is used.

tion and lowered to the right as far as possible, pointer locked (3) subject relaxes, reading taken.

Caution—Subject's shoulders must not be permitted to rise from the bench during movement. Knees must be moved directly sidewards at the height of the hips, not above or below.

Summary

An instrument and technic of flexibility or range of joint motion measurement have been presented which meet the criteria of validity, reliability, and objectivity.

The instrument and technic of measurement are equally applicable to movements of the trunk as well as movements of the extremities.

Movements recorded for the various body segments are comparable since all movements are recorded in degrees of a circle.

Reference

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Activity Analysis for Rehabilitation

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The purpose of this analysis of activities is to suggest various crafts and games that may be used to assist in rehabilitation of the disabled. Activities should be chosen with care to increase the motion of joints, to improve muscular strength, or to develop specific co-ordinations, according to the needs of each individual case. A possible advantage of exercising a muscle in several different activities is that some motor units of a muscle may be used when it contracts in one combination and other motor units used when it contracts in another combination.

I. Thumb: Flexion

Muscles involved — Flexor pollicis longus; Flexor pollicis brevis; Abductor pollicis brevis; Adductor pollicis, and Opponens pollicis.

ACTIVITY USED	MOTION INDICATED
Pottery	Pinching clay
Topography	Grasping type
Hammering	Grasping handle
Sawing	Grasping handle
Gardening	Flexing thumb to pull weeds and hold tools
Typing	Striking space bar
Piano	Striking keys
Card weaving	Turning cards, combing, and tying knots
Tennis	Grasping racket
Reading	Turning pages
Leather	Lacing
Writing	Holding pencil
Daily living	Tying shoes, dressing, shaving, eating
Jacks	Grasping jacks
String instruments	Picking strings
Knitting	Holding needles
Darts	Grasping darts
Ring toss	Grasping rings

II. Thumb: Extension

Muscles involved — Extensor pollicis longus and Extensor pollicis brevis.

ACTIVITY USED	MOTION INDICATED
Darts	Release dart
Marbles	Picking up
Ring toss	Fling hand open
Typing	Release space bar
Cutting	Opening scissors
Knitting	Release thread and needle
Loom weaving	Combing warp, placing shuttle through
Woodworking	Sanding with block
Basket weaving	Grasping materials
Cards	Dealing
Daily living	Opening hand to grasp objects

III. Thumb: Abduction

Muscles involved — Abductor pollicis longus; Abductor pollicis brevis; Opponens pollicis, and Extensor pollicis brevis.

ACTIVITY USED	MOTION INDICATED
Embroidery	Spreading and untangling
Weaving	Combing warp
Leather	Releasing tools
Jewelry	Releasing tools
Shuffleboard	Picking up puck
Checkers	Grasping and releasing checkers

IV. Thumb: Adduction

Muscles involved — Adductor pollicis and Flexor pollicis longus.

ACTIVITY USED	MOTION INDICATED
Pottery	Pinching pots
Leather	Grasping tools
Gardening	Grasping tools
Cards	Dealing, drawing
Finger painting	Hold thumb near finger

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Woodworking	Holding tools
Shaking hands	Squeezing hands together
Card weaving	Shifting cards
Sewing	Grasping needle
Jewelry	Grasping tools
Daily living	Grasping objects

V. Thumb: Opposition

Muscle involved — Opponens pollicis.

ACTIVITY USED	MOTION INDICATED
Weaving	Separating reeds
Writing	Opposing thumb and 1st and 2nd fingers
Gardening	Opposing thumb and 1st and 2nd fingers
Reading	Turning pages
Cat's cradle	Holding strings
Pottery	Throwing at wheel
Cooking	Mixing with hands
Crocheting	Holding needles, hooks, and thread
Shuffleboard	Static grip picking up pucks
Screw checkers	Gripping and screwing checkers
Peg checkers	Gripping pegs
Floor checkers	Grasping checkers
Ring toss	Grasping rings
Squeeze hockey	Squeezing syringe
Ping pong	Grasping and swinging paddle
Table hockey	Grasping stick

VI. Fingers (2nd, 3rd, 4th, 5th): Flexion

Muscles involved — Flexor digitorum profundus; Flexor digitorum sublimus; Flexor digiti quinti brevis; Opponens digiti quinti; Abductor digiti quinti; Lumbricales; Interossi Dorsales, and Interossi volares.

ACTIVITY USED	MOTION INDICATED
Needle work and sewing	Grasping needles and separating threads
Weaving, hand loom, card and floor	Pulling hand treadles, grasping shuttle, warping, threading, combing, beating
Metal and wood working	Grasping different sized handles
Pottery	Pinching and squeezing clay, wedging, potter's wheel
Drawing, writing	Grasping brushes or pencil
Carving	Grasping and holding object and tools
Darts, peg board, ping pong, ball	Grasping different size handles, picking up pegs, catching ball
Gardening	Grasping different size handles, in raking, hoeing, weeding
Musical instruments: wind, string, drum, piano	Moving fingers over air outlets, over keyboard, strumming, plucking, holding sticks
Topography	Picking out letters
Tooling, lacing, sewing, cutting, punching	Grasping tools
Typing	Pressing Keys

VII. Fingers (2nd, 3rd, 4th, 5th): Extension

Muscles involved — Extensor digitorum communis; Extensor indicis proprius; Lumbricales; Interossi dorsales, and Interossi volares.

ACTIVITY USED	MOTION INDICATED
Needle work and sewing	Grasping needles, cutting with scissors
Weaving	Beating, holding shuttle, combing
Metal and wood work	Grasping and manipulating tools in sawing, filing, hammering, sanding, planing
Carving	Sanding
Drawing, writing, architecture	Manipulating instruments
Ring toss, keg board, bowling, darts, ball	Flinging hand open, releasing object
Leather	Scissor cutting, punching holes, grasping tools
Typing	Releasing pressure on keys

VIII. Fingers (2nd, 3rd, 4th, 5th): Adduction

Muscles involved — Flexor digitorum profundus and Interossi volares.

ACTIVITY USED	MOTION INDICATED
Weaving	Combing warp
Metal and wood work	Sanding and polishing
Pottery	Pinching, molding, throwing at wheel
Finger painting	Movements in painting process
Ball games	Grasping ball

IX. Fingers (2nd, 3rd, 4th, 5th): Abduction

Muscles involved — Interossi dorsales; Abductor digit quinti; Lumbricales, and Extensor digitorum communis.

ACTIVITY USED	MOTION INDICATED
Needlework	Spreading and untangling threads
Ring toss, checkers, ball, piano playing	Releasing objects, catching and holding ball, reaching for keys

X. Wrist: Flexor

Muscles involved — Flexor carpi radialis; Flexor carpi ulnaris, and Palmaris longus.

ACTIVITY USED	MOTION INDICATED
Metal and wood work	Hammering, polishing, painting, sawing
Pottery	Wedging, throwing at wheel
Ping Pong, ball, darts, badminton, tennis	Throwing, hitting ball, swinging racket
Wood and soap carving	Grasping tools
Writing, painting, drawing	Making up strokes with brush, pen and art tools

XI. Wrist: Extension

Muscles involved — Extensor carpi radialis longus; Extensor carpi radialis brevis, and Extensor carpi ulnaris.

ACTIVITY USED	MOTION INDICATED
Ping pong, dice, jacks, tennis, ball, badminton	Back hand return, releasing dice or jacks, returning high bird, catching ball
Pottery	Rolling clay
Wood work	Planing, sanding, holding down objects, hammering

XII. Wrist: Radial Deviation

Muscles involved — Flexor carpi radialis and Extensor carpi radialis longus.

ACTIVITY USED	MOTION INDICATED
Carving	Grasping tools, holding objects
Finger painting	Movements in painting process
Musical instruments	Strumming, plucking
Fly casting	Throwing rod line out

Wood and metal work	Polishing
Ring toss, horseshoes	Releasing object

XIII. Wrist Ulnar Deviation

Muscles involved — Flexor carpi ulnaris and Extensor carpi ulnaris.

ACTIVITY USED	MOTION INDICATED
Musical instruments	Strumming, releasing fingers over air outlets
Fly casting	Throwing line over back and casting
Woodworking	Polishing

XIV. Forearm: Supination

Muscles involved — Biceps brachii and Supinator.

ACTIVITY USED	MOTION INDICATED
Weaving	Threading the loom
Jewelry	Polishing on wheel
Leather	Lacing
Ping pong	Hitting ball
Janitor work	Screwing light bulb in and out
Clocks	Winding and setting
Decorative processes	Sewing with long thread, knitting and crocheting
Canning	Screwing lids on jars
Fishing	Fly casting
Cards	Dealing and drawing
Reading	Turning pages
Pottery	Wedging
Daily living	Eating, dressing, combing hair

XV. Forearm: Pronation

Muscles involved — Pronator teres and Pronator quadratus.

ACTIVITY USED	MOTION INDICATED
Woodworking	Driving screws, chiseling
Janitor work	Screwing light bulbs in and out
Daily living	Opening doors, eating, and combing hair
Basketball	Dribbling, shooting
Weaving	Warping, threading, beating weft
Music	Playing string instruments
Fanning self	Hold arm stationary
Leather	Lacing
Jewelry	Soldering
Art	Painting, carving, paper mache
Bookbinding	Glueing
Decorative processes	Sewing
Pottery	Wedging
Square dancing	Twirls
Cooking	Beating, peeling

XVI. Forearm: Flexion

Muscles involved — Brachialis; Biceps brachii; Brachioradialis, and Pronator teres.

ACTIVITY USED	MOTION INDICATED
Archery	Drawing the string
Baseball	Pitching, batting, catching
Golf	Driving and putting
Rowing	Pulling back on the oars
Swimming	Breast and side stroke
Tennis	Serving and smashing
Weaving	Beating, winding yarn, threading loom, warping
Woodworking	Sawing, hammering, sanding, planing, rasping
Jewelry	Sawing, polishing, chiseling
Ironing	Bringing iron toward self
Cards	Dealing and drawing
Pottery	Wedging, rolling coils
Cooking	Mixing
Daily living	Filing nails, dressing, washing, combing hair, bathing
Painting	Large movements on walls
Finger painting	Large forearm movements
Gardening	Lifting, pulling weeds
Metal work	Filing, sawing, scraping

XVII. Forearm: Extension

Muscles involved — Triceps brachii and Anconeus.

ACTIVITY USED	MOTION INDICATED
Bowling	At start of approach
Tennis	Serving and playing
Volleyball	Hitting the ball
Horseshoes	Throwing the shoe
Ping pong	Hitting the ball
Basketball	Dribbling, passing and shooting
Cards	Putting cards on table
Weaving	Threading loom, winding yarn into ball, pushing beater back
Leatherwork	Lacing
Pottery	Wedging
Sewing	Pulling the thread through
Wood work	Hammering, sawing
Softball	Throwing, batting
Ironing	Pushing iron away
Finger painting	Using large forearm movements
Swimming	Side stroke, breast stroke, front crawl
Gardening	Raking, hoeing
Eating	Returning things to table
Boxing	Punching
Canoeing	Paddling
Fencing	Thrusting
Fishing	Fly casting

XVIII. Arm: Flexion

Muscles involved — Deltoid (anterior); Coracobrachialis; Biceps brachii, and Pectoralis major (clavicular).

ACTIVITY USED	MOTION INDICATED
Basketry and reed work	Pulling out reed of skeins and untangling
Horseshoes	Releasing shoes
Leatherwork	Lacing, sewing, tooling
Pottery	Wedging
Weaving	Pulling beater back
Woodworking	Sawing, planing, sanding, hammering, hand polishing, painting
Floor checkers	Picking up checkers
Peg checkers	Puttings pegs in holes
Ping pong	Swinging paddle
Ring toss	Throwing rings and picking them up
Shuffleboard	Thrust forward with pusher, return passively relaxing after each motion
Rowing	Pulling on oars
Swimming	Front crawl, most strokes
Topography	Setting type
Softball	Pitching

XIX. Arm: Extension

Muscles involved — Deltoid (posterior); Latissimus dorsi, and Teres major.

ACTIVITY USED	MOTION INDICATED
Woodworking	Sawing, sanding, planing, filing, etc.
Peg checkers	Pulling pegs out of holes
Horseshoes	Throwing shoes
Ring toss	Pulling arm back to throw
Swimming	Many strokes, especially back stroke
Rowing	Pulling on oars
Ping pong	Hitting ball
Skipping rope	Turning rope
Baseball	Pitching, batting
Shot putting	Before release of shot
Tennis	Swinging racket
Golf	Putting

XX. Arm: Medial Rotation

Muscles involved — Teres major; Subscapularis; Pectoralis major; Latissimus dorsi, and Coracobrachialis.

ACTIVITY USED	MOTION INDICATED
Weaving	Putting shuttle through shed, stringing warp on board
Pottery	Pouring, wedging
Woodworking	Driving screws
Tennis	Swinging racket
Baseball	Pitching and throwing
Ring toss	Releasing rings
Swimming	Strokes
Skioping rope	Turning rope
Softball	Pitching

XXI. Arm: Lateral Rotation

Muscles involved — Teres minor; Infraspinatus, and Deltoid (posterior).

ACTIVITY USED	MOTION INDICATED
Woodworking	Driving screws with elbow
Horseshoes	Throwing shoes
Leatherwork	Lacing
Knitting	Whole arm rotates in taking stitches
Ping pong	Swinging paddle
Baseball	Batting, pitching
Basketry and reed work	Pulling weaver up and over
Ring toss	Releasing rings
Fencing	Thrusting
Tennis	Hitting ball
Swimming	Crawl stroke when hand clears water

XXII. Arm: Abduction

Muscles involved — Supraspinatus and Deltoid (middle).

ACTIVITY USED	MOTION INDICATED
Peg checkers	Reaching for pegs in various positions on board
Shuffleboard	Picking up pucks
Archery	Drawing bow
Swimming	Breast stroke, in bringing arms up and over
Tennis	Serving and front stroke
Volleyball	Hitting ball when above shoulder
Baseball	Side arm pitching
Pottery	Spraying, wedging
Cards	Dealing
Weaving	Bringing shuttle through shed
Leather	Pulling through lacing
Screw checkers	Reaching to positions on board
Painting	Horizontal position
Boxing	Swinging
Fishing	Fly casting
Badminton	Hitting bird

XXIII. Arm: Adduction

Muscles involved — Pectoralis major; Teres major; Teres minor; Infraspinatus; Coracobrachialis; Triceps (long head), and Latissimus dorsi.

ACTIVITY USED	MOTION INDICATED
Floor checkers	Moving checkers
Peg checkers	Reaching pegs in various positions
Shuffleboard	Picking up pucks
Pottery	Throwing on wheel and bringing up sides of bowl
Woodworking	Sawing, planing
Golf	Swinging and carry through
Baseball	Batting
Tennis	Back stroke
Canoeing	Propelling phase
Boxing	Swinging
Leather	Lacing
Billiards	Stroking cue

XXIV. Shoulder Girdle: Upward Rotation

Muscles involved — Trapezius (1 and 2) and Serratus anterior.

ACTIVITY USED	MOTION INDICATED
Woodworking	Sawing, hammering, sanding
Weaving	Winding warp on warping board placed in vertical position
Ceramics	Wedging clay
Painting	Large surfaces in vertical position
Hanging clothes	To reach clothes line
Volleyball	Hitting ball at point above head
Tennis and badminton	Serving and smashing
Basketball	Shooting, reaching and jumping
Rowing	Pulling oars toward you
Wall checkers	Reaching to move checkers
Baseball	Pitching and batting

XXV. Shoulder Girdle: Downward Rotation

Muscles involved — Rhomboids; Levator scapula, and Pectoralis minor.

ACTIVITY USED	MOTION INDICATED
Woodworking	Standing on vertical surface, hammering and sawing
Swimming	Crawl and elementary back stroke
Weaving	Winding warp on warping board in vertical position
Ceramics	Wedging clay
Painting	On vertical surfaces using long strokes
Washing walls	Downward stroke
Chopping wood	Downward stroke
Tennis	Downward force on ball in serving and smashing
Rowing	Pushing oars away
Golf	Downward stroke in swing
Wall checkers	Moving checkers down
Blackboard games	Downward arm movement
Bowling	Releasing ball
Baseball	Batting and pitching

XXVI. Shoulder Girdle: Abduction

Muscles involved — Pectoralis minor and Serratus anterior.

ACTIVITY USED	MOTION INDICATED
Swimming	Crawl, breast stroke
Tennis	Follow through on stroke
Baseball	Pitching, throwing, batting
Gardening	Racking, hoeing, pushing lawn mower
Woodworking	Sanding, planing
Fencing	Thrust, lunge

XXVII. Shoulder Girdle: Adduction

Muscles involved — Trapezius (3 and 4) and Rhomboids.

ACTIVITY USED	MOTION INDICATED
Weaving	Beating
Gardening	Raking, hoeing
Art	Large scale drawing
Swimming	Back stroke, crawl, and breast stroke
Tennis	Swinging arms backward
Archery	Moving arm back to draw bow
Baseball	Swinging bat, throwing ball

XXVIII. Shoulder Girdle: Depression

Muscles involved — Pectoralis minor; Subclavius, and Trapezius.

ACTIVITY USED	MOTION INDICATED
Woodworking	Sawing
Ceramics	Wheel throwing
Weaving	Winding warp
Shoveling	Downward force on handle
Tennis	Forceful follow-through in smashing and serving
Bowling	In approach to release of ball
Art	Large scale drawing
Shuffleboard	In forward thrust

XXIX. Shoulder Girdle: Elevation

Muscles involved — Trapezius (1 and 2); Levator scapula, and Rhomboids.

ACTIVITY USED	MOTION INDICATED
Woodworking	Hammering above head, carrying lumber, sawing
Bowling	Lifting ball
Weaving	Winding warp on pegs above head, carding wool, and beating
Tennis	Serving and smashing
Volleyball	Reaching to hit ball
Swimming	Crawl, elementary back stroke, back crawl, forward thrust of arms
Basketball	Reaching for ball, jumping and shooting
Hanging clothes	Reaching high for things
Art	Large scale drawing
Painting	Reaching high places

XXX. Head and Neck: Extension

Muscles involved — Splenius captis and Semispinalis capitis.

ACTIVITY USED	MOTION INDICATED
Ring toss	Tossing rings
Basketball	Shooting and throwing
Badminton	Swinging at bird
Skeet shooting	Follow high birds
Discus throwing	Releasing discus
Softball	Pitching and throwing
Archery	Drawing bow
Horseshoes	Releasing shoes
Tennis	Every time you swing
Baseball	Batting and pitching
Golf	Following ball
Swimming	Holding head above water in every stroke
Painting	Large up and down strokes

XXXI. Head and Neck: Flexion

Muscles involved — Sternocleidomastoideus; Platysma; Rectus capitis anterior; Rectus capitis lateralis; Longus capitis; Longus colli; Scalenus anterior; Scalenus medius, and Scalenus posterior.

ACTIVITY USED	MOTION INDICATED
Tennis	Swinging and follow through
Golf	Putting and driving
Woodworking	Sawing, hammering
Shotput	Throwing shot
Painting	Large movement up and down
Playing violin	Holding violin under chin
Typing	Looking down at keys
Reading	Holding book close to chest
Swimming	Overhead stroke
Ironing	Looking down
Billiards	Looking down when stroking cue
Boxing	Holding chin down on chest
Ping pong	Swinging paddle
Ring toss	Picking rings up from floor
Shuffleboard	When thrusting forward

XXXII. Head and Neck: Rotation

Muscles involved — Sternocleidomastoideus; Splenius capitis; Semispinalis capitis; Rectus capitis anterior; Rectus capitis lateralis; Longus capitis; Longus colli, and Trapezius (clavicular).

ACTIVITY USED	MOTION INDICATED
Spectator	Watching tennis
Baseball	Batting
Painting	Large strokes on a horizontal plane
Weaving	Watching pattern and pedals
Archery	Sighting an aim
Typography	Setting type and copy fitting
Household work	Washing windows
High jumping	Clearing bar

XXXIII. Head and Neck: Lateral Flexion

Muscles involved — Sternocleidomastoideus; Scalenus anterior; Scalenus medius; Scalenus posterior; Rectus capitis lateralis.

ACTIVITY USED	MOTION INDICATED
Riflery	Aiming and holding butt of gun in shoulder pit
Archery	Aiming
Violin	Holding violin
Baseball	Batting

Swimming	Moving head from side to side
Shotputting	Throwing shot and approach with shot
Pole vaulting	Running with pole and when clearing bar
Discus throw	Approach with discus
Fishing	Fly casting
Golf	In follow through

XXXIV. Spinal Column: Flexion

Muscles involved — Rectus abdominis; External oblique; Internal oblique; Psoas major, and Iliacus.

ACTIVITY USED	MOTION INDICATED
Bowling, duck pins	Rolling ball
Baseball, football, basketball, tossball, handball, volleyball, speedball	Throwing, catching, picking up and hitting ball
Billiards, pool, golf, croquet, tennis, ping pong, hockey	Hitting ball with cue, mallet, racket, clubs, stick, paddle
Cycling	Bending over bars
Calisthenics	Bending forward, standing erect
Roping, casting, whipping	Hurling
Dancing, ballet, tap, folk, square, modern	Leaning forward, limbering up
Floor checkers	Moving checkers
Horseshoes, quoits	Throwing rings
Swimming	Kicking, flexing arm, bending back, floating on stomach
Woodchopping	Swinging axe
Dressing	Putting on clothes, tying shoes, putting on footwear
Eating	Leaning over and bringing food to the mouth
Gardening	Shoveling, spading, raking, hoeing, planting, pushing, wheelbarrow, picking weeds
Cleaning	Sweeping, dusting, mopping, vacuuming
Cooking	Bending over to cut, stir and mix food
Writing and typing	Bending over desk
Rowboating	Rowing boat
Shuffleboard	Pushing disk
Washing and ironing	Washing self, hair, clothes, ironing clothes

XXXV. Spinal Column: Extension

Muscles involved — Sacrospinalis; Multifidus, and Quadratus lumborum.

ACTIVITY USED	MOTION INDICATED
Billiards, pool	Backshot
Baseball, football, basketball, tossball, handball, volleyball, speedball	Catching, throwing, hitting
Football, speedball	Kicking
Horseshoes, quoits	Throwing rings
Calisthenics	Bending backward, standing erect, looking up
Darts, shot-putting, javelin throwing	Throwing
Tennis, ping pong, badminton, golf	Hitting with racket, paddle, club
Casting, whipping, roping	Flinging
Dancing, folk, ballroom, tap, ballet, modern	Bending backwards, dip, limbering up
Swimming	Backstroke, floating on back
Rowboating	Using oars
Woodchopping	Using axe
Drinking	Bringing glass or cup to mouth
Cleaning and painting	Painting ceilings
Undressing	Take off shoes, clothes
Fencing	Thrusting

XXXVI. Spinal Column: Lateral Flexion

Muscles involved — Quadratus lumborum; Levatores costarum; Sacrospinalis; Iliacus; Psoas major; Latissimus dorsi; Internal oblique; External oblique, and Rectus abdominis.

ACTIVITY USED	MOTION INDICATED
Billiards, pool	Shooting at ball
Bowling, duck pins	Rolling ball
Baseball, football, basketball, tossball, volleyball, handball, speedball	Passing, throwing, hitting
Croquet, golf, ping pong, badminton, tennis	Hitting ball with the mallet, club, paddle, racket
Floor checkers	Moving checkers
Gardening	Planting, weeding, raking, spading, picking, hoeing
Roping, casting, whipping	Lassoing, flinging, lashing
Rowing boat, canoe	Paddling, rowing
Shuffleboard	Pushing disk
Swimming	Sidestroke
Ironing	Pushing iron
Cooking	Grating
Painting	Brush strokes
Cleaning	Sweeping, mopping, vacuuming, scrubbing
Calisthenics	Bending sideward
Darts	Throwing
Horseshoes, quoits	Tossing rings
Jacks	Grabbing jacks
Dancing, folk, tap, ballet, ballroom, modern	Swinging, swaying, rotating
Finger painting	Smearing
Dressing and undressing	Removing and putting on wearing apparel, zipping, buttoning and buckling

XXXVII. Spinal Column: Rotation

Muscles involved — External oblique; Levatores costarum; Multifidus; Rotatores, and Sacrospinalis.

ACTIVITY USED	MOTION INDICATED
Bowling, duck pin	Rolling ball
Baseball, football, basketball, tossball, volleyball, handball, speedball	Tossing, catching, hitting ball
Darts	Throwing
Croquet, golf, badminton, tennis, ping pong	Swinging and hitting ball with mallet, club, racket, paddle
Shuffleboard	Pushing disk
Canoeing	Using two bladed paddle

Roping, casting, lassoing, whipping	Lassoing, flinging, lashing
Calisthenics	Twisting trunk
Fencing	Thrusting
Swimming	Sidestroke
Jacks	Grabbing jacks
Horseshoes, quoits	Tossing rings
Gardening	Hoeing, shoveling, spading, planting, raking, weeding
Jig saw	Sawing irregular shaped pieces

XXXVIII. Thorax: Inspiration

Muscles involved — Diaphragm; External intercostals; Serratus posterior; Serratus superior; Scalenus anterior; Scalenus medius; Scalenus posterior; Sternocleidomastoideus, and Platysma.

ACTIVITY USED	MOTION INDICATED
Resistance to inspiration	Inhale through a soda straw or other small tube
	Pinch nose, inhale through constricted lips as hard as possible
	Muscular exercises to produce labored respiration

XXXIX. Thorax: Expiration (forced)

Muscles involved — Internal intercostals; Serratus posterior; Serratus inferior; Rectus abdominis; Transversus abdominis; External oblique, and Internal oblique.

ACTIVITY USED	MOTION INDICATED
Resistance to expiration	Exhale through a soda straw or other small tube
	Pinch nose, exhale through constricted lips as hard as possible
	Fill a balloon
	Vigorous blowing into a spirometer
	Muscular exercises to produce labored respiration

XL. Abdomen

Muscles involved — Rectus abdominis; Internal oblique; External oblique; Transversus abdominis, and Pyramidalis.

ACTIVITY USED	MOTION INDICATED
The "Curl"	Back lying, hands resting on thighs, slowly raising head and back
"Un-Curling"	A reversal of the curl. Use arms for partial support when necessary
	Perform movements with a slight twist. Fill a balloon

XLI. Thigh: Flexion

Muscles involved — Iliacus; Psoas major; Sartorius; Rectus femoris; Pectineus; Gracilis; Adductor magnus; Adductor longus; Adductor brevis, and Tensor fasciae latae.

ACTIVITY USED	MOTION INDICATED
Ping pong	Walking, quick movements of feet
Weaving	Lifting thigh to treadle
Bicycle saw	Pedaling bicycle
Metalwork and jewelry	Using foot bellow
Ceramics	Foot power potter's wheel
Carpentry	Drill press, foot pedaling
Floor checkers	Stooping
Gardening	Stooping
Swimming, back, side, breast strokes, back and front crawl, treading	Diving, frog kick, scissors kick, flutter kick
Bowling	Walking, released ball position
Horseback riding	Posting
Shuffleboard	Pushing puck
Fencing	Thrusting
Dancing	Interpretive, ballroom, square
Skating	Gliding
Baseball, football, volleyball	Batting, running, kicking, skipping
Golf, badminton, tennis	Addressing, walking, serving, running
Printing press	Foot pedaling
Hop scotch	Hopping
Roller skating	As in walking
Tumbling,	Somersaults, leg holds
Climbing a rope	Flexes hip and thigh and spinal column at same time

XLII. Thigh: Extension

Muscles involved — Gluteus maximus; Biceps femoris; Semitendinosis; Semimembranosis, and Adductor magnus.

ACTIVITY USED	MOTION INDICATED
Weaving	Pushing treadle down
Metalwork	Using foot bellows
Floor checkers	Standing from stooping position
Ping pong	Walking, quick movements of feet
Pottery	Working foot power potter's wheel
Woodworking	Pushing bicycle saw
Swimming, treading	Scissors kick, flutter kick, frog kick
Printing	Foot power printing press
Bowling	Walking, lunge to throw ball
Shuffleboard	Walking, lunge to push puck
Gardening	Pushing wheelbarrow, walking with resistance, pushing on shovel
Scooter	Pushing to make scooter go
Planing and sawing	Reaching in a standing position
Boating and rowing	Bracing feet for balance
Cartwheels	Keeping legs straight
Tumbling	Landing in standing position, springing
Dancing	Quick movements of feet, dip
Roller and ice skating	Pushing to make skates roll or slide
Baseball, football, volleyball, basketball	Running and jumping
Golf, tennis, badminton	Walking, swinging, running and jumping

XLIII. Thigh Abduction

Muscles involved — Gluteus medius; Gluteus minimus; Piriformis; Sartorius; Gemellus inferior; Gemellus superior; Obturator internus, and Tensor fascia lata.

ACTIVITY USED	MOTION INDICATED
Weaving	On a large loom, reaching for pedals

Floor checkers	Pushing checkers sideways
Swimming	Frog kick
Interpretive dance, ballet	Lunges, kicks, second position
Rowing boat	Bracing feet
Hop scotch	Jumping with feet in two boxes side by side
Ping Pong	Reaching
Horseback riding	Mounting the horse
Fencing	Standard position and lunge
Cartwheels	Position assumed for proper execution
Tennis	Reaching to hit ball
Yogi exercises	Sitting tailor fashion

XLIV. Thigh: Adduction

Muscles involved — Quadratus femoris; Gracilis; Pectineus; Adductor magnus; Adductor longus; Adductor brevis, and Obturator externus.

ACTIVITY USED	MOTION INDICATED
Weaving	Treadling using one foot only on floor loom
Reed work	Holding object between knees
Floor checkers	Pushing them in sidewards
Gardening	Stooping, spading
Swimming	Frog kick, back stroke, breast stroke
Horseback riding	Straddling and gripping horse
Ping pong	Moving legs to follow ball
Roller skating	Crossing legs around turns
Modern dancing	Interpretive, popular, jive
Tennis	Running, side-stepping
Wrestling	Body slam, holding with legs

XLV. Thigh: Outward Rotation

Muscles involved — Quadratus femoris; Piriformis; Obturator externus; Obturator internus; Gemellus superior, and Gemellus inferior.

ACTIVITY USED	MOTION INDICATED
Weaving	Floor loom treadling
Pottery	Kick wheel
Shoveling	Position
Climbing ladder	Climbing rungs
Fencing	Lunge
Golf	Swinging
Baseball, soccer, basketball	Batting, kicking with instep, pivoting
Wrestling	Any hold
Diving	Race dive position
Ice skating	Spread eagle position

XLVI. Thigh: Inward Rotation

Muscle involved — Gluteus minimus.

ACTIVITY USED	MOTION INDICATED
Shoveling	Position
Wrestling	Any hold
Soccer	Kicking with outside of foot
Horseback riding	Posting
Basketball	Pivoting
Woodworking	Planing stance
Golf	Putting

XLVII. Leg: Flexion

Muscles involved — Sartorius; Gracilis; Semimembranosis; Semitendonosis; Popliteus; Biceps femoris; Gastrocnemius, and Plantaris.

ACTIVITY USED	MOTION INDICATED
Metal and woodworking	Operating a treadle-operated metal cutter, bicycle saw, sander
Pottery	Treadling on potter's wheel
Track	Running and jumping
Baseball	Catcher's position, running
Basketball	Running, springing
Football	Stance, running
Golf	Swinging and walking between holes
Swimming	Scissors kick, frog kick, diving
Tumbling	Somersaults
Fencing	Lunging
Calisthenics	Deep knee bends, bicycling
Dancing	Ballet or modern steps
Weaving	Treadling, treadle adjusted to vertical position
Hiking	Particularly over hilly ground
Gardening	Stooping in weeding and planting

XLVIII. Leg: Inward Rotation

Muscles involved — Sartorius; Semimembranosis; Semitendinosis, and Popliteus.

ACTIVITY USED	MOTION INDICATED
Dancing	Charleston
Climbing stairs or stepladder	Extra high steps and climbed with turned in toes
Track	Running

XLIX. Leg: Extension

Muscles involved — Rectus femoris; Vastus lateralis; Vastus medialis, and Vastus intermedius.

ACTIVITY USED	MOTION INDICATED
Metal and woodworking	Foot power metal cutter, bicycle saw and sander
Gardening	Spading, pushing wheelbarrow
Pottery	Treadling potter's wheel
Weaving	Treadling
Bookbinding	Foot power stapling
Dancing	Dance steps, especially dips
Football	Kicking
Fencing	Lunge
Shuffleboard	Approach
Soccer	Kicking
Golf	Swing and walking
Cycling	Pedaling
Swimming	Scissor, frog, flutter kick
Bowling	Stride
Hiking	Stride
Ice skating	Skating backwards

L. Leg: Outward Rotation

Muscles involved — Biceps femoris.

ACTIVITY USED	MOTION INDICATED
Dancing	Ballet and modern
Swimming	Diving stance
Ice skating	Spread eagle
Hurdling	Jumping
Cycling	Pedaling
Fencing	Lunge, advance and retreat steps

LI. Ankle and Foot: Dorsal Flexion

Muscles involved — Tibialis anterior; Peroneus tertius; Extensor digitorum longus, and Extensor hallicus longus.

ACTIVITY USED	MOTION INDICATED
Bicycle saw	Working pedals
Bicycle sander	Working pedals
Sewing	Working treadle
Foot power lathe	Working pedal
Foot pedal drill press	Working pedal
Piano playing	Working pedals
Organ playing	Pumping pedals
Playing foot pedal base drum	Working pedals
Cycling	Working pedals
Potter's wheel	Working wheel with ball of foot
Roller skating	Raising skates from floor
Ice skating	Raising skates from ice
Walking	Up steep grades
Water tread mill	In keeping wheel revolving
Treading water	Movement of feet
Swimming	Kicking of feet
Skipping rope	Landing on toes
Stoop tag	Stooping
Driving a car	Releasing gas pedal, clutch and brake
Rowing a boat	By bracing feet while rowing
Basketball	Running, jumping and shooting
Football	Running and kicking
Soccer	Running and kicking
Bowling	Approach and release of ball
Climbing stairs	Place only ball of foot on stairs
Duck walk	Walking in squatting position
Tennis	Running and jumping
Overhead loom	Feet placed in pullies that operate lams by dorsal flexion

LII. Ankle and Foot: Plantar Flexion

Muscles involved — Tibialis posterior; Soleus; Gastrocnemius; Peroneus longus; Peroneus brevis; Plantaris; Flexor digitorum longus, and Flexor hallicus longus.

ACTIVITY USED	MOTION INDICATED
Floor checkers	Moving checkers with toes
Foot power potter's wheel	Manipulation on wheel
Bicycle saw	Working pedals
Bicycle sander	Working pedals
Bicycle lathe	Working pedals
Gardening	Spading and stooping
Weaving	Working treadles
Playing foot pedal base drum	Working pedals
Skipping rope	Landing on toes
Cycling	Working pedals
Driving a car	Working brakes, clutch, and gas pedal
Boxing	Standing on toes
Diving	Springing from board on toes
Swimming	Kicking feet
Running	Running on toes
Shot putting	Rising on toes in approach
Discus throwing	Rising on toes in approach
High jumping	Approach on toes and land on toes
Hurdles	Run, takeoff, and land on toes
Broad jumping	Approach, takeoff, and land on toes
Baseball	Running, batting, catching, pitching
Basketball	Running, jumping and shooting
Bowling	Approach and stop
Tumbling	Takeoff and landing
Climbing stairs	Push off on toes
Trampolene	Landing on toes
Boating	By bracing feet when rowing
Piano playing	Working pedals
Bicycle drill press	Working pedals

LIII. Ankle and Foot: Eversion

Muscles involved — Peroneus tertius; Peroneus longus, and Peroneus brevis.

ACTIVITY USED	MOTION INDICATED
Pottery	Kicking wheel
Weaving	Going from pedal to pedal
Floor checkers	Pushing checkers with outside of foot
Baseball	Batting and pitching
Everter exercise	Pick up wad of paper with toes. Place in hand abducted moderately from side (right foot, right arm)
Ballet	Dancing and exercising
Charleston	Movements of dance

LIV. Ankle and Foot: Inversion

Muscles involved — Tibialis anterior; Tibialis posterior; Extensor hallicus longus; Gastrocnemius; Flexor digitorum longus and Flexor hallicus longus.

ACTIVITY USED	MOTION INDICATED
Inverter exercise	Pick up wad of paper with toes and place in hand (left foot, right hand)
Floor checkers	Pushing checkers with inside of foot
Inverter exercise	Walk ten to thirty yards on sides of feet with toes curled inward
Golf	Stance when swinging
Ball toss	Squeeze a ball between your feet and toss it in the air
Inverter exercise	Invert your foot and run it up inside of other leg as far as possible
Pottery	Kicking wheel with left foot
Soccer	Kicking ball with side of foot
Weaving	Moving feet from treadle to treadle

EDITORIAL

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION
OFFICIAL JOURNAL

American Congress of Physical Medicine and Rehabilitation
American Academy of Physical Medicine and Rehabilitation

The Passing of Lord Horder

Word has come to us of the death, at Petersfield, England, in mid-August, at the age of 84 years, of one of the great physicians of our time, Lord Horder, president of the International Federation of Physical Medicine, physician to Queen Elizabeth II and to the late King George VI. Lord Horder was one of the great international leaders in the field of physical medicine and rehabilitation. He was president of the First International Congress of Physical Medicine in London, in 1950, and following this meeting, he was elected president of the International Federation of Physical Medicine.

Educated at the University of London and at St. Bartholomew's Hospital, he was consulting physician at St. Bartholomew's Hospital and the first member of its staff to achieve the peerage. He was advisor to the Minister of Food and president of the Food Education Society, chairman of the committee advising the Minister of Labor and the National Health Service on Medical Questions. He was connected with recruiting, chairman of the Shelter Hygiene Committee of the Ministry of Home Security and the Ministry of Health, honorary consulting physician to the Ministry of Pensions, president of the Harveian Society of London, chairman of the British Empire Cancer campaign, chairman of its Advisory Scientific Committee and president of the Fellowship of Medicine.

During his lifetime, he served also as president of the Medical Society of London and of the Eugenic Society. He was president of the British Association of Physical Medicine, of the Family Planning Association and of the Marriage Guidance Council. Also, he had served as chairman of the Noise Abatement League, as president of the National Amenities Council and as president of the Cremation Society. He was chairman of the Empire Rheumatism Council of greater London and chairman of the Fellowship for Freedom in Medicine.

He was the author of many medical books, including such well-known textbooks as "Clinical Pathology in Practice," "Cerebral Spinal Fever" and "Essentials of Medical Diagnosis." His broad interests and his humanitarianism led him to support and encourage many societies designed to maintain the welfare of the individual. He traveled widely, wrote much and lectured in most parts of the world. He was a man who appreciated the vast contributions of science, as only a true scientist could.

It was Lord Horder who said: "The average individual recognizes that at the present time both politics and economics—and some would add even religion—regarded as systems for human betterment, seem to have failed him and science alone is not bankrupt." He was a writer who appreciated good literature, as only a great author could. He was the person who said: "Propagandism is the servant of expediency; literature is for all time." He was a patrician who appreciated the im-

portance of quality and who, as a teacher, did much to improve the quality of medical practice among his many students. He was the savant who said: "As a disciple of Francis Galton, I am much more interested in the quality than in the quantity of our people."

During his lifetime, he directed his facile mind toward the consideration of an amazingly wide range of important new phases of medical practice and national health in war and in peace. In more recent years, with the ending of World War II, he had evinced a broad interest in the social aspects of medicine. During his latter years, physical medicine and rehabilitation were among his major interests; and his clear, prophetic mind was among the first to appreciate the important contributions which are being made in these fields. It was said of him that he was "kind and wise to a degree not so often met with nowadays" and that he was "one of the finest examples of the true physician." The members of the American Congress of Physical Medicine and Rehabilitation join with their colleagues in England and throughout the world in mourning the passing of Thomas Jeeves Horder.

Frank H. Krusen, M.D.

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

Personals

D. Elliott O'Reilly, St. Louis, was elected chairman of the committee on Physical Medicine for 1955 at the 97th annual session of the Missouri State Medical Association. He was recently a participant in a symposium titled "The Handicapped Child" held at the Central Institute for the Deaf in St. Louis. — **Michael M. Dacso**, New York City, addressed and served as consultant to the Governor's Conference on Aging at Olympia, Wash. He has also been appointed to serve on the Technical Advisory Committee for a research project in the field of aging conducted by the Community Service Society under a grant from the Rockefeller Brothers Fund. He will also serve as Consultant on the Health, Medical Care and Rehabilitation Committee of the Governor's Conference on Problems of the Aging, New York State. — At the recent meeting of the American Medical Association at Atlantic City, a Certificate of Merit was awarded to **Walter J. Treanor, Raoul C. Psaki,** and co-sponsors, for the scientific exhibit "Restitution of Function Following Hemiplegia." — **Nicholas Mauriello**, Wilkes-Barre, Pa., has been appointed medical consultant to Pennsylvania State Bureau of Rehabilitation. — **William D. Paul**, Iowa City, participated in the annual meeting of the Iowa Academy of General Practice; he spoke on "The Athletic Injury." — **Edwin Welsh**, Milwaukee, was the main speaker at a public forum on arthritis held at the Vocational School auditorium in Madison, Wis.

Arthur S. Abramson, New York City, has been appointed Professor and Chairman of the Department of Rehabilitation Medicine at the Albert Einstein College of Medicine of Yeshiva University, and Director of Rehabilitation Medicine at the Bronx Municipal Hospital Center. He has also been elected President of the New York Society of Physical Medicine and Rehabilitation as well as Chairman of the Sub-Committee on Physical Medicine and Rehabilitation of the Council Committee of Public Health and Education of the Medical Society of the State of New York. — The Medical College of South Carolina and the new Medical College Hospital announce

the appointment of **Harry W. Mims** as Associate Professor of Physical Medicine and Rehabilitation and Director of the Hospital's Department of Physical Medicine and Rehabilitation. Dr. Mims was formerly Associate in Physical Medicine and Rehabilitation at the Georgia Warm Springs Foundation.

Arthur C. Jones, Portland, Ore., was a member of a panel discussing rheumatic diseases at the meeting of the Eastern Oregon District Medical Society. His topic was "Physical Medicine in Rehabilitation of Arthritis." — **Louis N. Rudin,** Baltimore, is now engaged in the private practice of physical medicine and rehabilitation. He formerly was Chief, PM&R Service, Fort Howard VA Hospital. — **Arthur M. Pruce,** Atlanta, has developed a new technic for injecting needles into joints. This technic will be illustrated by one of the world's foremost medical illustrators, Dr. Frank Netter, and included in a ten volume study of all the systems of the body. Dr. Pruce's technic was first presented at the American Medical Association meeting. — **Edward B. Shires** has been appointed Assistant Professor of Physical Medicine at the University of Kansas School of Medicine. — **Arthur L. Watkins,** Boston, is serving as Medical Director of the Bay State Medical Rehabilitation Clinic; **George W. Geiss,** Boston, is Assistant Medical Director. — **Herman J. Bearzy,** Dayton, Ohio, was the principal speaker at the annual state convention of the Ohio Chapter of the American Physical Therapy Association. — **James W. Rae, Jr.,** Ann Arbor, Mich., is chairman of the Medical Committee of the State of Michigan Commission for the Employment of the Physically Handicapped. — **Leo Rosenberg,** Dayton, Ohio, was recently awarded the employ-the-handicapped (EPH) citation for 1954.

Officers of the AMA Section on Physical Medicine and Rehabilitation are **Frances Baker,** San Mateo, Calif., Chairman; **Louis B. Newman,** Chicago, Vice-Chairman, and **Walter J. Zeiter,** Cleveland, Secretary. — **Ferdinand F. Schwartz,** Birmingham, Ala., participated in the meetings of American Association of Rehabilitation Therapists and Association for Mental and Physical Rehabilitation. He was recently appointed acting chief of PM&R at the Birmingham VA Hospital; he is also serving on the Board of Directors of the Alabama Mental Illness Association. — **Donald A. Covalt,** New York City, is serving on the Medical Advisory Committee set up to give counsel to the Social Security Administration on medical aspects of administering the new "disability freeze" provision in the social security law.

VA Residency Program in PM&R

Veterans Administration has launched a residency training program in physical medicine and rehabilitation for its fulltime career physicians.

The new plan, which has an obligated service requirement, has a three-fold purpose: To meet the demand for specialized care and treatment of veteran patients in VA hospitals and clinics; to relieve the shortage of physiatrists certified by the American Board of Physical Medicine and Rehabilitation in VA's Department of Medicine and Surgery, and to strengthen VA's career service.

Prior service in the Veterans Administration will not be a requirement for this training as long as the obligated service contract is signed.

Formal residency training will be provided at VA hospitals approved for such training by the American Medical Association and the American Board of Physical Medicine and Rehabilitation.

Selection of VA physicians will be restricted to physicians in intermediate or lower grades. To be eligible, physicians also must be approved by the manager and the Deans Committee of the training hospitals concerned.

Individual contracts with physicians selected for this training will require that: For one year served in training, the obligated service shall be one additional year; for two years served in training, the obligated service shall be one and one-half additional years, and for three years served in training, the obligated service shall be two additional years.

The application should be sent to the manager of the VA hospital where the physician wishes to take his residency training.

New Physical Therapy School Approved

The Council on Medical Education and Hospitals of the American Medical Association at its June meeting in Atlantic City voted to extend approval to the school for physical therapists conducted at the University of Oklahoma, Oklahoma City.

Institute Conducted

Creighton University School of Medicine, together with the Nebraska State League for Nursing and the Nebraska Arthritis and Rheumatism Foundation, sponsored a three-day Institute on Rehabilitation of Neuromuscular Diseases and Rheumatic Diseases at Creighton Memorial St. Joseph's Hospital on September 8, 9 and 10. Guest speakers were Joseph G. Benton, M.D., Coordinator of Education and Research at the Institute of Physical Medicine and Rehabilitation in New York City; William A. Spencer, M.D., Medical Director of the Southwestern Poliomyelitis Respiratory Center, Associate Pro-

fessor of Pediatrics at Baylor University, Houston, Texas, and William B. Robinson, M.D., professor of Medicine at the University of Michigan.

National Society to Meet

Chicago has been selected as the 1955 convention city for the National Society for Crippled Children and Adults, the Easter Seal Society. Dates are Nov. 28-30 at the Palmer House.

Top authorities in rehabilitation, medicine, welfare, business, industry and government will participate in this year's program marking the Society's 35th year of service to crippled children and adults across the nation.

The 1955 meeting will highlight the latest developments and newest technics in the care, training and treatment of the crippled, emphasizing the strides being made in rehabilitation. Convention sessions will include speeches, institutes, seminars, workshops, round table discussions and demonstrations by leading experts in the rehabilitation field.

Grant for Rehabilitation Program

The National Foundation for Infantile Paralysis has made a three year grant of $97,963 to the University of North Carolina School of Medicine, Chapel Hill, for the development of a comprehensive program of teaching the concept and basic technics of total patient care and rehabilitation to undergraduate and graduate medical students and associate medical personnel. Under the grant, the university will develop a teaching and service program in total rehabilitation and will offer educational and consultation services to community hospitals throughout North Carolina, strengthening rehabilitation services available to handicapped residents of the whole state. The grant will provide for employment of a medical director, an occupational therapist, a supervising nurse, and a medical social worker in the rehabilitation program.

Physical Therapy Degree Offered At Ohio State

A new degree at Ohio State University, "bachelor of science in physical therapy," was established on Monday, June 13, by action of the university's Board of Trustees.

Ohio State Vice President Frederic Heimberger told the board that the new study program was proposed " . . . as a way of offering instruction in a field which is becoming increasingly important, particularly in the rehabilitation of persons who may be incapacitated through accident or illness."

Conference on Rheumatic Disease

The Midwest Conference on Rheumatic Diseases will be held in Detroit, October 5, Henry Ford Hospital.

The entire day will be devoted to postgraduate sessions covering the field of arthritic diseases. The program is sponsored by the Michigan Chapter of the Arthritis & Rheumatism Foundation and the Michigan Rheumatism Society. Co-sponsorship of this meeting has been obtained from the Department of Postgraduate Medicine University of Michigan Medical School; Michigan State Medical Society; Wayne University College of Medicine; Academy of General Practice, and the Wayne County Medical Society.

Details covering the meeting may be had by writing James Lightbody, M.D., 7338 Woodward Ave., Detroit 2.

New Magazine on Rehabilitation

"The World the Handicapped Live In" is the title of a new 30 page picture magazine recently published by the Institute for the Crippled and Disabled, 23rd Street and First Avenue, New York City. The new magazine dramatizes pictorially the problems of children and grownups whose disabilities—congenital, accidental, and from disease—require comprehensive rehabilitation if those affected are to survive and prosper in an environment not designed for them. More than 100 pictures are presented in separate sections, so as to point up the specific activities that the handicapped must be able to do in order to live in the world of the able-bodied. Copies of the publication may be obtained without charge from the institute.

Academy Elects Officers

The Pennsylvania Academy of Physical Medicine and Rehabilitation recently elected the following officers: Dr. Joseph F. Dreier, Wilkes-Barre, president; Dr. James S. Martin, Lancaster, vice-president; Dr. J. Murl Johnston, Pittsburgh, secretary-treasurer, and Dr. Igho Kornblueh, chairman of the program committee.

OT Annual Meeting

The 38th annual Occupational Therapy Convention will be held in San Francisco, October 22—28 at the Sheraton Palace Hotel. The theme of the meeting is "Bridges to the Future." Outstanding leaders in various medi-

cal and allied fields will present current trends and problems in the fields of orthopedics, neurology and psychiatry as well as tuberculosis, geriatrics, and pediatrics.

Any interested individual or group may obtain further program and convention information by writing to Northern California Occupational Therapy Association, 1680 Mission Street, San Francisco.

"Danger at the Source"

The National Fund for Medical Education has produced its first documentary film, "Danger at the Source," it was announced by the Fund's president, S. Sloan Colt, New York.

Prepared as a public service by Fox Movietone, the film tells the story of medical education in America. Ray Middleton, star of "Annie Get Your Gun" and "South Pacific," contributed the narration.

"Filmed in medical schools and teaching hospitals, supervised by leading medical educators, 'Danger at the Source' highlights the glories and the hard work of the American brand of medical teaching that has made ours the healthiest nation in the world," Colt said.

"Our first film will be a potent aid in bringing home to the American public the critical importance of the nation's 81 medical schools, the seed-bed of all medical care. These schools face the threat of diminishing funds to carry on their teaching programs. Medical education and the need to support it as a free and progressive force for the national welfare is the business of all of us. I hope the film will make this obligation apparent to all who view it."

Services for the Cerebral Palsied

More than 600 medical and social agencies are being asked to participate in a survey to be conducted by the Coordinating Council for Cerebral Palsy in New York City to determine (1) where services for the cerebral palsied are actually available; (2) the number of persons receiving care; and (3) the nature of the available services. It is expected that on the basis of the information received through the survey, it will be possible to avoid setting up duplicating services and that the need for expanding certain services will be recognized. Family and counseling agencies, child care services, and community planning organizations will be included in the survey as well as those agencies primarily concerned with services to the handicapped. On completion of the survey of agencies, the coordinating council is planning a further study to determine the actual known prevalence of persons with cerebral palsy in this city. On the basis of these two surveys, it is anticipated that it will be possible to plan a complete program of care for the cerebral palsied in New York City. Dr. George G. Deaver, professor of clinical physical medicine and rehabilitation at New York University-Bellevue Medical Center, is president of the council, and Dr. William Cooper, assistant professor of clinical orthopedic surgery at Cornell University Medical College, is chairman of the committee carrying out the survey.

Good News for Diabetics

"The Diabetic's Cookbook" is being published this month. This unique book brings to the diabetic more than 250 recipes for foods and beverages that he can eat and enjoy. Each recipe is written and arranged so that it can be fitted quickly into the individual diabetic's diet prescription. Indeed, "The Diabetics Cookbook" is such a practical cookbook for diabetics that Dr. Charles H. Best, one of the discovers of insulin, has written the introduction in which he says, "I have no hesitation in recommending this book most highly and I feel sure that a very large number of diabetics—and their families—will welcome its publication and will profit by reading it."

"The Diabetic's Cookbook" is published by The Medical Arts Publishing Foundation, 1603 Oakdale Street, Houston 4, Texas.

Postgraduate Cerebral Palsy Courses

Speech therapists and nurses who are properly qualified and experienced in the field of rehabilitation are now eligible for admission to these courses, heretofore available only to physicians and to occupational and physical therapists. One major purpose of the courses is to stimulate the student to do his own critical thinking. Informal questioning of lecturers is encouraged. In "give and take" discussions, in class and in clinic, students enjoy opportunities to clarify their ideas and to learn from the experience of others. For further information, address Office of the Dean, Columbia University, College of Physicians and Surgeons, 630 W. 168th St., New York 32.

Seminars for Physical Therapists and Nurses

New York University-Bellevue Medical Center offers a four-week course in "Advanced Physical Rehabilitation Methods for Physical Therapists" starting November 21 through December 16, 1955; February 6 through March 2, and April 30 through May 25, 1956.

Also offered is a three-week seminar in "Physical Rehabilitation Methods for Nurses" starting October 24 through November 11, 1955; January 9 through January 27, and

April 2 through April 20, 1956.

For complete details write Mrs. Edith Buchwald Lawton, Director Rehabilitation Courses for Physical Therapists, New York University-Bellevue Medical Center, 400 E. 34th St., New York 16.

Richard Kovács Fund

A RICHARD KOVACS FUND has been established by the Council of the Royal Society of Medicine. At the present time, the fund is being used to purchase for the Library of the Royal Society of Medicine, books on the subject of Physical Medicine. All books, so purchased, carry a special bookplate indicating that they are provided in memory of Dr. Kovács.

In Memoriam

Dr. A. W. Offenthal of New York City died on July 7, 1955; Dr. Edward A. Klauber of Stapleton, New York died on May 1, 1954.

Books Received

Books received are acknowledged in this column as full return for the courtesy of the senders. Reviews will be published in future issues of the journal. Books listed are not available for lending.

Leg Ulcers—Their Causes and Treatment by S. T. Anning; **Principles of Medical Statistics** by A. Bradford Hill; **Love and Hate in Human Nature** by Arnold A. Hutschnecker; **Principes de L'Education Religieuse Morale et Sociale** by Albert Kriekemans; **A Textbook of Neurology** by H. Houston Merritt; **Your Ideal Weight: A Calorie Counter** by Roland A. Mulhauser; **Tissue Culture Technique in Pharmacology** by C. M. Pomerat and Elmer L. Sevringhaus; **Sex and Its Mysteries** by George Scott and Peter Garland; **Drugs in Current Use 1955** by Walter Modell; **The Technique of Psycho-Analysis** by Edward Glover; **The Spino-Cerebellar Degenerations** by J. G. Greenfield; **Clinical Neurosurgery: Proceedings of Congress of Neurological Surgeons; Medical Greek and Latin At a Glance** by Agard-Howe; **Physiology and Anatomy, with Practical Applications** by Esther Greisheimer; **Neuro-Rontgendiagnostik Des Schadels** by H. Dietrich; **Reproductive System, The Ciba Collection of Medical Illustrations** by Frank Netter; **Viral Hepatitis: Clinical, Laboratory and Public Health Aspects** by Heinz F. Eichenwald; **Clinical Diagnosis** by Elmer G. Wakefield; **Bone: An Introduction to the Physiology of Skeletal Tissue** by Franklin C. McLean and Marshall R. Urist; **Insanity, Art, and Culture** by Francis Reitman; **Early Care of Acute Soft Tissue Injuries** by Committee on Trauma of American College of Surgeons; **An Outline of the Treatment of Fractures** by Committee on Trauma of American College of Surgeons; **Essentials of Biological and Medical Physics** by Ralph W. Stacy, et al; **Wiederherstellung Der Lebenstuchtigkeit Geschadigter Menschen** by Hans Hoske; **Kinesiology** by Katharine F. Wells; **Communicable Disease** by Franklin H. Top; **Significance of the Body Fluids in Clinical Medicine** by Alexander Leaf and L. H. Newburgh; **Incest Behavior** by S. Kirson Weinberg; **The Practice of Dynamic Psychiatry** by Jules H. Masserman; **Electrocardiografia** by Emilio Araya; **Teaching Physiology and Anatomy in Nursing** by Hessel H. Flitter and Harold R. Rowe; **Low Back Pain in Industry** by Henry H. Kessler; **Proceedings of the Third Medical Conference of Muscular Dystrophy Associations of America, Inc.; Poliomyelitis** by Robert Debre, et al; **Aids to Psychiatry** by W. S. Dawson; **Peripheral Vascular Diseases—Diagnosis and Treatment** by William S. Collens and Nathan D. Wilensky; **Pain Its Mechanisms and Neurosurgical Control** by James C. White and William H. Sweet; **The Management of Acute Poliomyelitis** by C. P. Stott and M. Fischer-Williams; **Physikalisch-Diatetische Therapie** by Hans-George Scholtz; **Textbook of Physiology** edited by John F. Fulton; **Bone and Bones—Fundamentals of Bone Biology** by Joseph P. Weinmann and Harry Sicher; **Society and Medicine, Lectures to the Laity** edited by Iago Galdston; **Experiencing the Patient's Day: A Manual for Psychiatric Hospital Personnel** by Robert W. Hyde; **Childbirth: Theory and Practical Training** by Marjorie F. Chappell; **Systemic Associations and Treatment of Skin Diseases** by Kurt Wiener.

Newly Registered Therapists

Bissonnette, Joan C., 2 Elm St., Middleboro, Mass.

Burr, Jane, 102 Adelaide Rd., Manchester, Conn.

Cate, Judith S., Box 968, Fredericton, New Brunswick, Canada.

Cook, Donna Watters, 229 E. Mitchell Ave., State College, Pa.

Dautch, Caryl Ruth, 562 Richmond Ave., Buffalo.

Goldman, Carol Lee, 21 Woodcliff Rd., South Brookline, Mass.

Grinwis, Carol R., 74 Truscan Rd., Maplewood, N. J.

Landis, Janet Emma, Putnam House, Fort Hill Terrace Apts., Scarsdale, N.Y.

Lape, Gwendolyn E., 400 College Ave., Montour Falls, N.Y.

Mercer, Nancy Louise, Box 197, Westminster, Mass.

Mitchell, Robin E., RFD 1, Laurel Park, Norwich, Conn.

Morrill, Anne Radcliffe, 83 Thoreau St., Concord, Mass.

Mutty, Phyllis V., 5 Sudbury Rd., Concord, Mass.

Newman, Adele G., 81 Howard St., Braintree, Mass.

Robohm, Viorine Ann, c/o A. T. Valicenti, 126 Iron Hill St., East Weymouth, Mass.

Russell, Frances, 1 Lone Pine Rd., Biltmore Forest, Asheville, N. C.

Schenkelberger, Virginia L., Beech St., Box 141, Dennis, Mass.

Taylor, Jean W., Old Orchards, Rt. 1, Box 33, Newton, Conn.

Tite, Judith Ann, 29 Highland Ave., Cohasset, Mass.

Wilson, Barbara Louise, 45 Popham Rd., Scarsdale, N.Y.

Wiranis, Janet, 9 Manor St., Dorchester, Mass.

June 28, 1955

Ahola, Aune Nancy, 53 Wilson St., Fitchburg, Mass.

Almeida, Frank R., 4 Myrtle Pl., Taunton, Mass.

Chaney, Rhea Jane, 56 Hawkins St., New Britain, Conn.

Cury, Daisy Mae, c/o Cury's Dept. Store, Wheelwright, Ky.

D'Onofrio, Anne L., 30 Morris Cove Rd., New Haven, Conn.

Drohan, Barbara Ann, 56 Concord Ave., Milton, Mass.

Greenfield, Margery E., 1405 Sarsfield Ave., Camden, S. C.

Guest, Florence M., 17 Bassett Ave., Mine Hill, Dover, N.J.

Hazelum, Dorothy J., 50 Harrison St., Quincy, Mass.

Knouse, Nancy Ann, 1206 Oak St., Coatesville, Pa.

Lally, Jane A., 2 Fairfield St., Salem, Mass.

Langille, Margaret L., Post Rd., Wells, Me.

Longo, Rosemary, Van Kleeck Rd., Millis, Mass.

Messinger, Beverly Ann, 74 Summer St., Everett, Mass.

Mitchell, Jacqueline R., 379 Columbus Ave., Boston.

Osborn, Carol Ann, 8 Chelmsford St., Chelmsford, Mass.

Richardson, Janet M., 52 Irving St., Waltham, Mass.

Schmidt, M. Carolyn, 537 Washington St., Brookline, Mass.

Stees, Virginia H., Stillwater Farm, Lansdale, Pa.

Wadell, Barbara E., 351 McKinley Ave., New Haven, Conn.

Winters, Norma K., 19 Lenox St., Lawrence, Mass.

July 14, 1955

Raymond, Lawrence, 288 Crown St., Brooklyn 25.

July 22, 1955

Adams, Shirley Louise, Westcliffe, Colo.

Ahrens, Girard F., 1325 Laurel St., Menlo Park, Calif.

Gilbert, Harold LeRoy, Box 234, Myrtle Point, Ore.

Hull, William Robert, 430 Jefferson Ave., Ogden, Utah.

Hultquist, Barbara Joyce, 1666 Garfield Ave., Salt Lake City.

Johnson, Thomas G., 1198 Edith St., Hayward, Calif.

Levy, Joanne B., 700 Shattuck Ave., Taft, Calif.

Marcusen, R. Lex, 38 W. Main, Hyrum, Utah.

Maughan, Conway L., 789 E. 9th N., Logan, Utah.

Maughan, Merlin B., Wellsville, Utah.

McGhie, Marlen Dean, 2670 Waverly St., Palo Alto, Calif.

Mitchell, Joan, Box 2433, Carmel, Calif.

Morton, Mary Elizabeth, 8301 N. Allen Lane, Milwaukee.

Provost, M. Elizabeth, Box 686, Soledad, Calif.

Stratton, Lois O., 506 Roosevelt Dr., Evansville, Ind.

August 2, 1955

Bird, Mary Lou, 909 Mansfield St., Winfield, Kans.

Byler, Dorothy Lou, Cimarron, Kans.

Cassi, Catherine Ann, Rt. 3, Box 441, Morgantown, West Va.

Hogue, Raymond Ellsworth, 509 E. 27th Pl. N., Tulsa, Okla.

Knauss, Kathleen Anne, 923 Lane, Topeka, Kans.

Millard, John Lorimor, 367 W. First St., Hoisington, Kans.

Watts, Fern Eileen, RR 1, Fremont, Iowa.

Wright, Mary Jo, PO Box 366, Bartlesville, Okla.

Recent Publications by Members

Paul A. Nelson and Walter J. Zeiter, "Treatment of Osteoarthritis of the Cervical Spine." The Ohio State Medical Journal, July, 1955.

Herman J. Flax, "Preventive Medicine from the Physiatric Point of View." Boletin de la Asociacion Medica de Puerto Rico, May, 1955.

Murray B. Ferderber, "The Role of Nutrition in Geriatric Restoration." The Pennsylvania Medical Journal, July, 1955.

Edward P. Reese, with co-author, "Respiratory Disturbances Due to Poliomyelitis." Medical Technicians Bulletin, May-June, 1955.

Grace M. Roth, with co-authors, "Direct Arterial Study of the Blood Pressure Response

to Cold of Normotensive Subjects and Patients with Essential Hypertension Before and During Treatment with Various Antihypertensive Drugs." Circulation, June, 1955.

Louis N. Rudin, "Physical Medicine and Rehabilitation in Hemiplegia." Maryland State Medical Journal, April, 1955; "Treatment of Lymphedema of the Extremities by Rhythmic Mechanical Directional Compression." Current Medical Digest, July, 1955.

Edward W. Lowman, "Rehabilitation of the Patient with Chronic Rheumatoid Arthritis: A Two-Year Study." Journal of Chronic Diseases, June, 1955.

Grace M. Roth, with co-authors, "The Use of Hexamethonium in Treatment of Arteriosclerosis Obliterans." Circulation, April, 1955.

S. Malvern Dorinson, "Physical Medicine for Injured Hands." California Medicine, April, 1955.

Frank H. Krusen, "Your Future in Physical Medicine and Rehabilitation." The Journal of the Student American Medical Association, May, 1955.

Howard A. Rusk, "Early Management of the Paraplegic Patient." United States Armed Forces Medical Journal, February, 1955.

Ferdinand F. Schwartz, "Rehabilitation of the Disabled Worker." Medical Times, April, 1955.

Odon F. von Werssowetz, "Biophysical Principles in Selection of Hand Splints." The American Journal of Occupational Therapy, March-April, 1955; with co-author, "Training in the Use of the Functional Assist for the Flail Hand." The American Journal of Occupational Therapy, May-June, 1955.

The following papers have been published in issues of The Journal of The American Medical Association:

Clarence W. Dail, with co-authors, "Clinical Aspects of Glossopharyngeal Breathing." June 11, 1955.

Maxwell D. Flank, with co-author, "Therapy for the Newly Blinded, As Practiced with Veterans." July 9, 1955.

George Deaver, with co-authors, "The Homebound Child." May 21, 1955.

Fred B. Moor, "Diagnosis and Treatment of Idiopathic Facial Paralysis (Bell's Palsy)." April 30, 1955.

William Bierman, "Therapeutic Use of Cold." April 2, 1955.

Miland E. Knapp, with co-author, "Diagnosis and Treatment of the Painful Shoulder." March 19, 1955.

D. J. Erickson; G. M. Martin; F. H. Krusen, with co-author, "Present Value of Ultrasonic Diathermy." March 19, 1955.

The following papers have been published in issues of The Physical Therapy Review:

Arthur A. Rodriquez, with co-author, "A Schedule of Charges for Physical Therapy Service." June, 1955.

Harry T. Zankel, with co-author, "Recovery of Muscle Function in Paraplegia." June, 1955.

Harold Storms, "A System of Joint Measurement." July, 1955.

Keith C. Keeler, with co-authors, "Sitting Brace." July, 1955.

The following papers have been published in issues of The American Journal of Physical Medicine:

John H. Kuitert; Anthony L. Brittis; John H. Aldes, with co-author, "Control of Keloid Growth with Ultrasonic Energy." June, 1955.

George M. Piersol, with co-author, "Special Review. The Absorption of Electromagnetic Energy in Body Tissues: Part II. Physiological and Clinical Aspects." June, 1955.

Morton Hoberman, "Physical Medicine and Rehabilitation: Its Value and Limitations in Progressive Muscular Dystrophy." February, 1955.

Elizabeth Austin, "Participation of the Family and Patient in a Program of Rehabilitation." February, 1955.

W. D. Paul, "Medical Management of Contractures in Muscular Dystrophy." February, 1955.

R. Plato Schwartz, with co-authors, "Recording Progressive Muscular Dystrophy by Split-Frame Cinematography." February, 1955.

Ernst Fischer, "Changes in Protein and Enzymes in Muscular Degeneration Subsequent to Denervation." February, 1955.

Arthur S. Abramson, "A Symposium. MDAA Chapters and the Patient Service Program." February, 1955.

Edward B. Shires, with co-author, "Physical Therapy in Thoracic Surgery." April, 1955.

Harry M. Hines, with co-authors, "Volume Blood Flow Measurements in the Hind Extremity of the Dog Using Venous Occlusion Plethysmography." April, 1955.

Jerome W. Gersten, "Effect of Ultrasound on Tendon Extensibility." April, 1955.

William D. Paul, with co-author, "Temperature and Blood Flow Studies after Ultrasonic Irradiation." April, 1955.

Fritz Friedland, "Ultrasonic Therapy with Special Reference to Rheumatic Diseases." April, 1955.

The following papers have been published in issues of American Archives of Rehabilitation Therapy:

Arthur S. Abramson and Alfred Ebel, with co-authors, "Teamwork in Medicine." March, 1955.

Harry T. Zankel, "Unipolar Electromyography." June, 1955.

Val W. Rapp, "The Inter-Relation of Educational Therapy and Manual Arts Therapy in a Neuropsychiatric Hospital." June, 1955.

The following papers have been published in the May 20, 1955 issue of Department of

Medicine and Surgery Information Bulletin:
Arthur S. Abramson, "A Rehabilitation Research Project."

Samuel G. Feuer, with co-author, "A Rational Approach of Physical Medicine and Rehabilitation in the Low Back Problem."

Louis Schwartz, with co-author, "Keeping the Amputation Stump Clean."

A. B. C. Knudson, "Volunteers—An Asset in Rehabilitation."

John G. Bisgrove, with co-author, "A Temporary Walking Lift."

J. E. Brown, with co-author, "Therapy Through Hospital Improvement Suggestions."

PHYSICAL MEDICINE ABSTRACTS

Ankylosing Spondylitis. F. D. Hart, and N. F. Maclagan. Ann. Rheumat. Dis. **14**(1):77 (Mar.) 1955.

The authors reviewed 184 cases of rheumatoid spondylitis. In reviewing these case histories in detail it became clear that certain "small symptoms" were frequently present in the few months or years preceding the onset of the classical backache. These minor symptoms included mild intermittent fibrositis and mild involvement of peripheral joints. If early symptoms are accepted as part of the disease process, the authors found that 61 of these 184 patients developed the first symptoms of disease before their twenty-first birthday.

They maintained that measurement of spinal flexion can be done properly only by using an instrument which eliminates movement of the hip and leg. The usual mode of measuring the distance of the fingers from the floor, with the spine in full flexion, is erroneously influenced by hip mobility, painful hamstring, and tenderness. Dunham's "Spondylometer" which measures spinal movement between the sacrum and verebra prominens was recommended. In 40 normal medical students, the spinal range lay between 75 degrees and 120 degrees and bore no relation to ability or inability to touch the floor with the fingers. In 143 of the patients at their first examination, the range lay between 0 degree and 60 degrees.

This study emphasizes that bony tenderness may be a major complaint in spondylitis, the common sites being the ischial tuberosities, pelvic brim, greater trochanters, and occasionally over the sacrum, vertebral spinous processes, sternum, and ribs. Such tenderness may warrant local deep x-ray therapy to the affected part. They cited one classical spondylitic with x-ray evidence of a punched-out area in the head of the humerus and an acutely painful shoulder in whom all symptoms and signs disappeared in five years, without treatment to the shoulder.

Osteochondral Fracture of the Femoral Condyles. M. B. Coventry, and A. J. Walt. Surg., Gynec. & Obst. **100**(4):591 (May) 1955.

A blow to the knee, usually with it partially flexed and with the blow directed to either femoral condyle, may result in an osteochondral fracture. A chip of cartilage with its subjacent bone is broken off, and may lie free in the joint. It is thought that this injury occurs more commonly than is generally suspected. One may assume that in children and adolescents the fracture fragment would be mostly cartilage, with little or no bone attached; in adults, the percentage of attached bone would be higher.

Diagnosis is made by a carefully recorded history, and by demonstration of the osteochondral fracture by roentgenography. X-rays reveal a sliver or fleck of bone in the joint, except when the fragment has not separated; special views may be necessary, and intercondylar-notch and tangential patellar projections may be helpful. Pain and effusion in the joint occur, and aspiration reveals bloody fluid.

Treatment consists of arthrotomy and excision of the fragment. If arthrotomy is delayed six to eight weeks after injury, the condyler defect becomes filled in with fibrocartilage and difficult to detect. The loose fragment also becomes rounded off, and usually fixed to a fold of synovial tissue.

Single loose osteocartilaginous bodies in the knee joint may be the result of osteochondral fracture, as well as of osteochondritis dissecans.

Some Emotional Factors in Rheumatic Disease. James S. Brown'ng. West Virginia M. J. 51(4):103 (April) 1955.

There is increasing evidence that emotional factors play an important role in the development, perpetuation, and management of patients with rheumatic disease of various types. In rheumatic diseases, as in peptic ulcer or asthma, psychologic factors may be as much an important determinant as biologic factors are an important determinant in mumps and measles. Treatment of the rheumatic patient without giving due thought to the emotional factors involved is doomed to failure in most cases.

At the same time, interpretive "uncovering" analytic psychotherapy by an inexperienced and poorly trained therapist is fraught with danger, for even though symptoms of arthritis may be entirely relieved, a severe and totally disabling depressive reaction may be precipitated.

Any capable, understanding doctor may accomplish much by employing a supportive relationship type of psychotherapy. A doctor's kindness to his patients will go far in relieving much of their suffering. During weekly interviews in which the doctor would maintain a noncritical, nonjudgmental attitude, the patient would talk more and more about his problems in life, and be encouraged to correlate his problems with increase or decrease in symptoms. The doctor who becomes upset or disturbed when carrying out this type of therapy would do well to avoid its use.

Reconstruction of the Hip Joint. Howard B. Shorbe. West J. Surg. 63(4):205 (April) 1955.

Fracture of the femoral neck and necrosis of the head is a major physical catastrophe. Disability and pain are severe and this condition frequently but indirectly results in death in the elderly. The superiority of producing a painless functioning hip with grafts and osteotomies in which the head of the femur survives is unquestioned. However, with death of the head, some substitution must be made if a mobile, stable hip is to be retained.

The author studied 33 patients with Whitman and Colonna reconstructions to determine how successful these older procedures were. Two-thirds of the results were considered successful. It was observed that results were unsatisfactory in one-third of the patients, and these were over 60 years of age. The pattern of recovery is complete at one year, and satisfactory or unsatisfactory results may be predicted with accuracy at that time. The mortality is sufficiently low so as to permit surgical revisions if necessary. The author feels that these reconstructions that have withstood the test of time have been neglected for an unproved method that has deceptively encouraged surgeon and patient alike for a year or so only to disappoint them both as time progressed.

It is urged that these reconstructive operations be utilized for patients under 60 years of age with destroyed femoral heads. It is also suggested that with rare exceptions prostheses be confined to patients over 60 years of age.

Aid to the Needy Disabled. Paul Hartendorp. Rocky Mountain M. J. 52(4):356 (April) 1955.

The author emphasizes that the understanding and help of physicians is necessary to solve adequately the problems raised by persons applying for aid because of accident, sickness, and disability. It is not simple to determine whether or not needy applicants should receive disability assistance payments. The creation of psychological dependency should be prevented through successful rehabilitation where that is feasible.

The practitioner of medicine is an essential participant in this program, and every physician should have a clear understanding of his responsibility. If a recipient of a grant is not, in actuality, permanently and totally disabled, doctors are accessories to the fact. Conversely, the disabled, deserving poor, must be aided. The Federal Social Security Act permits temporary assistance to salvage remaining capacities for gainful occupation.

Medical science cannot always be absolutely accurate in the determination of the degree of physical disability, but the following essential considerations should guide the examiner.

1. All cases should be individualized.
2. Age, education, past working experience and available employment in a community should be considered in the preparation of the medical report.
3. Is the disability temporary or permanent?
4. What rehabilitation resources, including social casework services, are available in the community?
5. Does the individual possess a personality dependency or independency?

BOOK REVIEWS

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

SURGERY OF THE ELBOW. By *Frederick M. Smith*, M.D. Cloth. Price, $10.75. Pp. 340, with 154 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Illinois, 1954.

Dr. Smith has written this monograph with the purpose of bringing into one book the best treatment for pathology of the elbow by means of the various surgical procedures and physical therapy or roentgen-therapy. Under traumatic lesions of the elbow region, the various fractures, epiphyseal separation and epiphyseal trauma, dislocations, nerve injuries, etc., are all considered from the standpoint of both early and late treatment. Complications are described and methods of care discussed. Late deformities and disabilities, resulting from fracture or dislocation, are adequately discussed. A chapter is given to conditions in the elbow region or joint due to trauma other than fracture or dislocation, such as loose bodies, chronic synovitis, bursitis, rupture of biceps, tendons, or sprain. A chapter is given to non-traumatic conditions of the elbow region or joint, such as infections, various forms of arthritis, osteoid osteoma, neoplasms and metabolic disorders. Chapters describe rehabilitation, anesthesia, special operations, etc.

The book seems very complete. It has an excellent bibliography, organized under special headings. This book can be highly recommended.

PRINCIPES DE L'EDUCATION RELIGIEUSE MORAL ET SOCIAL. By *Albert Kriekemans*. Paper. Price, 69 Fr. B. Pp. 170. Editions Nauwelaerts, Louvain, Belgium, 1955.

This brilliant but confusing book leads the reader through difficult discussions of such concepts as education, religion, normalization, self-realization, and conscience, to the conclusion (p. 167) that a religious, supernatural interpretation of life is an adequate guide for the educational cycle. Since the reader will assent to this only if he uses these words in the same senses as the author does, it might have been easier to assign arbitrary, operational definitions to them in the beginning. The author is content to make his ideas sound plausible in terms of the vague ideas of Bergson, Jung, and others, with only an occasional scant sampling of the vast contributions of recent pedagogical research. This book is stimulating but not scientific, and is recommended only to mature readers alive to the fallacies that must result whenever a term changes meaning in the midst of an argument.

WORKMEN'S COMPENSATION. BY *Herman Miles*, and *Anne Ramsay Somers*. Cloth. Price, $6.50. Pp. 341. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, 1954.

In the preface, the authors state they had to write this book in order to learn what had happened to Workmen's Compensation in the United States. In this, they have succeeded. They have been able to condense what they have learned into one of the smallest volumes printed, and to cover all aspects of the Workmen's Compensation; that is, history, legislation, administration, litigation, insurance, actual benefit experience; and the related fields of industrial safety, health, and rehabilitation.

The chapter on rehabilitation was of special interest to the reviewer. Although concise it covered the subject thoroughly from the standpoint of history, definition, survey of the problem, and recommendations. Obviously the authors' source of information was excellent.

Although the book could not serve as an adequate reference for any single phase of Workmen's Compensation, it should provide an excellent quick reference for anyone to gain a general description or appraisal of the program as a whole.

ANNUAL REVIEW OF PHYSIOLOGY. Edited by *V. E. Hall.* Vol. 17. Cloth. Price, $7.00. Pp. 551. Annual Reviews, Inc., Stanford, Calif., 1955.

The 1955 Annual Review of Physiology is the seventeenth of these, by now standard, reference books. It begins with an excellent philosophical chapter written by Frank C. Mann of Mayo Clinic and continues with the most exhaustive review of pertinent American and foreign literature. It is recommended that everyone in the field of clinical or experimental medicine should have access to these indispensable volumes.

VIRAL HEPATITIS: CLINICAL, LABORATORY, AND PUBLIC HEALTH ASPECTS. By *Heinz F. Eichenwald,* M. D. Paper. Price, $0.55. Pp. 59. U. S. Department of Health, Education and Welfare, Public Health Service Publication No. 435, 1955.

"Viral Hepatitis" is designed to provide practicing physicians and health officers with basic facts on present methods of diagnosis, treatment, and prevention of hepatitis. The evolution of the term "viral hepatitis" is explained along with the reasons for its present acceptance.

There is a voluminous literature on the subject of viral hepatitis and most of our present knowledge is based on work done since World War II. The pamphlet presents the material in concise fashion with the aid of diagrams and tables.

LEG ULCERS: THEIR CAUSES AND TREATMENT. By *S. T. Anning,* M.D. Cloth. Price, $4.00. Pp. 178, with 42 illustrations. Little, Brown and Company, 34 Beacon St., Boston, 1954.

This volume gives a good review of the etiology, pathologic physiology, and treatment of leg ulcers due to venous stasis. A better name for it might therefore have been what Gay called "Venous Ulcers."

A great deal of emphasis is rightly placed upon the importance of the "muscle pump" in maintaining venous return. But omitted is the electrical method of maintaining this muscle pump by sinusoidal stimulation of calf muscles. Also the author mentions "deep massage" as an important physical therapy procedure without further delineation that this massage should be of the deep friction type and directed centripetally.

Most of the text is clear and interestingly written. There are a few ambiguous passages which the author no doubt will correct in subsequent editions. For example on page 29, he states;—"The blood flow through varicose veins (as distinct from the limb as a whole) might become slowed on account of the increased venous bed resulting from dilatation of veins, but this would not effect the capillary flow on which the nutrition of tissues and the removal of metabolites depends."

This book is recommended for students and physicians interested in the treatment of venous leg ulcers.

PULMONARY DISEASES. Edited by *Roscoe L. Pullen,* M.D. Cloth. Price, $15.00. Pp. 669, with 195 illustrations. Lea & Febiger, Washington Sq., Philadelphia 6, 1955.

This book is primarily a text of pulmonary illnesses. It seems to be geared more to the needs of the medical student or the general practitioner rather than to the internist, the chest surgeon, or the physiatrist.

The first chapter contains a section on anatomy with illustrations; a section on respiratory physiology, and a section on the basis of symptoms. It is entirely too brief to give one more than cursory information on this important subject. The rest of the book is very readable and presents a good idea of classification of pulmonary disease with some indication as to methods of diagnosis and treatment.

In certain respects this book has many shortcomings: No reference to "hyaline membrane disease," a disease of the newborn which has come to light in recent years and about which much has been written mostly in the pediatric literature is included. In terms of treatment of some of the inflammatory and obstructing diseases of the tracheo-bronchial tree, there was no mention of Aerosol therapy. With the development of excellent apparatus to supply large quantities of continuous Aersol and its importance in the treatment of pulmonary disease, this is a criticism of the text. There has also been a great deal of work done on the use of positive pressure breathing for various types of pulmonary disease in the last few years. This aspect of treatment was only mentioned in regard to the treatment of emphysema.

From the standpoint of the physiatrist, this book has many shortcomings. All physiatrists are interested in exercise in rehabilitation of patients following chest surgery, and yet there was practically no mention of physical therapy in rehabilitation of post-operative chest surgery cases. In the field of tuberculosis where the need for rehabilitation services during and following the activity of the disease is so well recognized by the physiatrist, practically no comment as to the requirements of the patient in this respect was made.

This is an average textbook of pulmonary disease with very little information that cannot be obtained from a general text of medicine.

CANADIAN CANCER CONFERENCE. PROCEEDINGS OF THE FIRST CANADIAN CANCER RESEARCH CONFERENCE, HONEY HARBOUR, ONT., CANADA, June 16-19, 1954. Volume I. Edited by *R. W. Begg*. Cloth. Price, $8.80. Pp. 443, with illustrations. Academic Press, Inc., Publishers, 125 E. 23rd St., New York 10, 1955.

In June 1954, the first Canadian Cancer Research Conference was held at Honey Harbour, Ontario. The National Cancer Institute of Canada, founded in 1947, stimulated and organized the conference, bringing together investigators from Canada, Europe, and the United States.

The proceedings presented during the four days of the conference have been compiled into this first volume. The papers are divided into four major sections dealing with experimental tumors; tumor-host relations; enzymes, and ionizing radiations. A small fifth section dealing with cancer of the lung is included.

Literature on the subject of cancer is constantly growing. In this book one gets an excellent perspective of the research that is being carried out in this field, and the theoretical foundations for it. The book is well printed with good photographs, clear diagrams, satisfactory index, and practical bibliographies.

This book does not provide physiatrists with material of direct and immediate concern to their specialty. But physiatrists should maintain a professional interest in the study of cancer which remains a major challenge to all in Medicine and Biology.

DER ULTRASCHALL IN BIOLOGIE UND MEDIZIN. By *Walter Beier*, Ph. D., and *Erich Dorner*, M.D. Cloth. Price, DM 17.50. Pp. 167, with 69 illustrations. Georg Thieme, Verlag, Leipzig, Germany, 1954.

American Medicine is today critically sampling the popular acclaim of ultrasonic therapy while fully aware that much of such publicized opinions are often loaded with enthusiasms beyond the border of reality. Out of this milieu of yesterday's enthusiastic empiricism its assets and liabilities have been realistically weighed in the balance, thus contributing to its broadening scope in such diversified fields as medical practice; industrial and chemical pursuits, and diagnostic implications. And even though the theme of this volume is limited to the exposition of ultrasonics in biology and medicine, it indirectly affirms this all embracing thesis of a new medium and positive force, valuable when intelligently applied for its unnumbered possibilities.

At first glance the content of this volume is seemingly a twice-told tale of what has already been published by pioneer workers here and abroad. Its more studious evaluation, however, demonstrates a careful synthesis of data because it has placed emphasis on value rather than on volume. This is exemplified in its bibliography of authors and references carefully screened from the current literature amounting to almost five thousand international contributions. Thus this book may well be considered as a streamlined labor, to provide the most valid data in the shortest space for those in search of basic information. Such a balance is achieved by Beier and Dorner each aiming at presenting the total values of ultrasonic energy as determined from its physical nature, its biologic action and therapeutic effect.

Accordingly this volume explains in great detail and within three sections the fundamental nature of ultrasound—its physical nature together with its mechanics of elastic and electromagnetic waves, their speed, intensity and amplitude, its piezoelectric effect, its penetration in relation to frequency, the importance of dosage, its meaning, and physical and biologic measurement in medicine. The second section deals with its biologic influence, which is presented in a quality that avoids redundancy. Therein the exposition touches on the entire spectrum of ultrasonic influence from unicellular organism, changes in blood chemistry and bacteria, observations on lower animals as well as on all the special organs in man.

The final section deals with its consideration in human disease, and its technic. Herein specific therapeutic instructions are clearly outlined from personal and voluminous experience of extraneous sources and provide guidance covering the major expanse of indications and limitations, as well as definitive suggestions of proper technics. This book is a condensed exposition of top current information of the fundamental action, effect and technics now practiced by world authoritative physicians. It is enthusiastically recommended to those familiar with the German language or to a hoped for future edition in English. The publishers are to be commended for the beauty and clarity of its format and the authors for a substantial contribution.

FOURTH ANNUAL REPORT ON STRESS. By *Hans Selye*, M.D., and *Gunnar Heuser*, M.D. Fabrikoid. Price, $14.00. Pp. 749. Acta, Inc., Medical Publishers, Montreal, Que., Canada, 1954.

Recognition of the term "Stress" as a tangible force in the orientation of living material is with passing time constantly assuming a more profound significance as evidenced by the impressive scale of the scientific contributions by international authorities. The review of the literature in the succeeding "Annual Reports on Stress," first initiated by Selye in his monograph of 1950, has been

continued in the four subsequent supplements in order to bridge the gap of the vast information on "Stress" including the adaptive hormones and the disease of adaptation. In this connection it is worth mentioning that each of these annual reports consists of a detailed critical review of the most important problems as well as discoveries and evaluations from each year's laboratory and clinical research on the overall progress of stress.

The present report not only repeats this objective but also contains independent original articles by invited guest-authors of international reputation in their respected fields. Part I reviews the Stress concept of 1954 in the form of a brief synopsis and its principal problems as viewed and/or related to its physiologic and pathologic action. To this section is therefore added ten timely and pertinent contributions by invited authors, with the privilege of all the freedom of thought and expression found in scientific communication.

Part II presents a classified index of current literature on Stress, The General Adaptation Syndrome, The Adaptive Hormones (Acth, Sth, Cortocoids, Adrenergic Hormones). The data in this index are classified according to body systems that come under the physiologic and pathologic control of Stress—its resistance, metabolic changes and organ changes. Once again Selye has presented a text so detailed in content and so fabulous in implication as to distinguish this continuity of his brilliant labors as a major asset to scientific medicine in an age where only extraordinary contributions are given first priority.

SPORTS INJURIES. By *Christoper Woodard*. Cloth. Price, $3.00. Pp. 128, with illustrations. Max Parrish and Company, Ltd., 55 Queen Anne St., London W I, England. Distributed by Track & Field News, PO Box 296, Los Altos, Calif., 1954.

This volume is intended as a handbook for athletic coaches and trainers. Its purpose is to guide them in the active mobilization of soft tissue injuries. The author is particularly careful to exempt the more complex injuries requiring expert medical care although, at times, the decision is left with the trainer.

The author has had considerable experience both as an athlete and as a practicing physician serving as consultant to the British Olympic Teams. It is difficult for a physician reading this book to wonder whether we are interested always in getting the athlete back into competition or in preventing possible permanent damage which may develop over a prolonged period of time. This is particularly true in the so-called ligament injuries which involve the major weight-bearing joints, namely, the knee and ankle. The author is quite outspoken in his opposition to immobilization of these joint injuries. He revives the use of procaine infiltration followed by activation. No mention is made of ethyl chloride.

A chapter is devoted to manipulation. It is here where one is apt to disagree, particularly in permitting a lay person to manipulate an injured neck. One might also question the stretching of an elbow joint with soft tissue damage. Myositis ossificans does not constitute a problem in the opinion of the author. Groin pain is discussed in the light of minor muscle strain without mention of a possible hernia.

This book might well be utilized as a reference by the average American trainer or coach who carries out the instructions of the team physician who is primarily responsible for all injuries—soft tissue or otherwise.

LOBOTOMY—A CLINICAL STUDY. By *A. Miller*, M.D. Paper. Pp. 107, with illustrations. Ontario Department of Health, Toronto, Ont., Canada, 1954.

Perhaps lobotomy is no longer considered by so many a procedure of "therapeutic desperation." It is also possible that with improved technics there may be less damage of the "frontal lobe deficit" type in terms of irreversible personality changes. Nevertheless, psychosurgery is a serious intervention which involves certain post-operative risks including a small percentage of mortalities. It is, therefore, of paramount importance for the medical profession to be presented with a clear picture of the various factors involved in this operation. There has been a number of fine publications in this field, however this monograph edited by Dr. Miller of the University of Toronto is by far one of the best in terms of comprehensiveness, clarity, organization of material, original planning, and visual aids. One may also add that it is not surprising that such a well-planned program has produced clinical results which compare very favorably with most other studies.

The authors of this study planned to determine which clinical syndromes were benefited by lobotomy and what were the effects of lobotomy on psychological and physiological functions. The usual criteria for selection of patients were used: Those suffering from intractable mental disorders where the prognosis was poor and where all other forms of therapy were considered ineffectual. Furthermore, these patients were expected to benefit from lobotomy "in the light of clinical experience gleaned from other sources and our own experiences." The standard closed operation was performed in most cases and, as far as possible, by the same surgeons.

A simple but revealing rating scale was used in evaluating the condition of the pa-

tient. The scale ranged from zero to one hundred. Zero to thirty indicated that the patient was functioning at a level requiring hospital care. Forty to sixty points were credited to a patient capable of functioning out of a hospital but still restricted in social effectiveness. Seventy to one hundred points indicated adjustments approaching normal level.

Of the 144 patients reviewed (two of the original 147 died following operative procedure and one died six months later of unknown causes), 57 patients remained hospitalized; 87 or 66 per cent no longer needed hospital facilities. It is noteworthy that the authors list eight patients who, although living at home, were really functioning at a level requiring hospital care but were maintained at home by devoted families. Therefore, actually 79 patients or 55 per cent of the originally selected group were functioning at various levels of effectiveness in the community. This is quite impressive considering the type of patients selected and the fact that the average length of illness was 9.6 years.

Each chapter in the book presents material which would be of interest to most readers. For instance, there is a discussion of predictive judgement by the members of the clinical staff. They did not seem to do so well having predicted accurately only in 54 of the 144 patients. There were about as many predictions that were too high—optimistic—as too low (28 per cent and 24 per cent respectively). Another chapter deals with long term response to lobotomy. Such questions are answered as "over what period of time does maximum improvement take place?" It was learned that if a patient made a satisfactory response over a time span of six months he continued to maintain such improvement. Another chapter entitled "Special Studies" analyzed the effect of lobotomy on such symptoms as tension (reduced), sex drive (in a few cases abnormal excess, however in general improvement of sexual adjustment), carbohydrate metabolism, weight gain, and many others. There is also an interesting description of the effect of lobotomy on delusions, hallucinations, adjustment to work, personality functioning. Other chapters deal with dynamic aspects of factors influencing the response to lobotomy, electro-encephalographic data, and various psychological studies.

There is also a chapter with illustrative case material representing various categories of patient reaction to lobotomy. Seven pages of bibliography complete the book. Although there is no index, it is hardly missed. One of the most impressive features of the book is the splendid utilization of colored charts and tables which will be found useful and appealing even to those allergic to the usual statistical presentations.

This monograph on lobotomy by Dr. Miller and his associates of the Department of Psychiatry of the University of Toronto is very highly recommended to all those interested in the subject.

TISSUE CULTURE TECHNIQUE IN PHARMACOLOGY. By *C. M. Pomerat* and *E. L. Sevringhaus*. Annals of the New York Academy of Sciences, Volume 58. Paper. Price, $4.50. Pp. 356, with illustrations. New York Academy of Sciences, 2 E. 63rd St., New York 21, 1954.

This volume is the report of the pioneer conference on the applications of tissue culture technics in pharmacology. It contains a series of papers, all of which have direct relationship to the subject and which present an excellent cross-section of the activity current in the field of tissue culture, particularly as it applies to drugs.

The usual expeditious and careful editing, which is characteristic of the volumes sponsored by the New York Academy, has been well done under the direction of Dr. Pomerat.

The volume is profusely illustrated with plates of actual tissue cultures, many tables and graphs, as well as figures of apparatus. The papers are well written and easily read. The short discussions of many of these by conference participants adds to the value of each.

It would seem that this volume would be considered indispensable to the modern pharmacologist. In the same way it provides a wealth of technical and factual material to anyone interested in tissue culture work. This would apply both to the newcomer in the field as well as to the experienced investigator.

DIAGNOSIS AND LOCALIZATION OF BRAIN TUMORS: A CLINICAL AND EXPERIMENTAL STUDY EMPLOYING FLUORESCENT AND RADIOACTIVE TRACER METHODS. By *George E. Moore*, M.D. Cloth. Price, $10.50. Pp. 241, with 87 illustrations. Charles C Thomas Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1953.

This small monograph presents an interesting account of the early attempts to utilize fluorescent and radioactive substances, primarily in the localization of tumors of the central nervous system. The clinical data included is most useful—especially the comparisons of the fluorescent and radioactive technics with other standard neurosurgical diagnostic procedures.

There is no extensive background provided in instrumentation. However, the clinical procedures are adequately described. Errors are not common, but a definition of the abbreviation, m.e.v. = millelectron volt, is

obviously a mistake of a most fundamental nature.

As the most complete and specialized presentation of this subject, the book is heartily endorsed. At the present writing, (June 1955), this field has advanced much farther than would be gathered from reading this monograph. This is especially true in the percentage of successful use of either fluorescent or radioactive materials. In addition, several additional radioisotopes are now commonly used.

A TEXTBOOK OF NEUROLOGY. By *H. Houston Merritt*, M.D. Cloth. Price, $12.50. Pp. 746, with 181 illustrations and 128 tables. Lea & Febiger, Washington Square, Philadelphia 6, 1955.

In this book, the author presents the diseases of the nervous system as a part of internal medicine. It is written especially for general practitioners and students and is very readable. Common diseases are described in detail and established methods of therapy given. Less common neurological syndromes are examined in less detail. Physiological and biochemical factors in the pathogenesis of disease are fully discussed.

There is nothing particularly new in the approach to the study of Neurology in this book. It is rather distressing that a new book on this subject, intended for medical students, should omit a constructive approach to the hopeful and dynamic treatment offered by physical medicine and rehabilitation for certain neurological diseases, particularly in those instances where little else can be done for the patient. There is no discussion of the role of physical medicine and rehabilitation treatment, early, to prevent complications which keep a patient bedridden unnecessarily and later to make it possible for the patient to develop maximum independence within the limits of his disability.

1955 MEDICAL PROGRESS: A Review of Medical Advances During 1954. Edited by *Morris Fishbein*, M.D. Cloth. Price, $5.00. Pp. 346. McGraw Hill Book Company, Inc., 330 W. 42nd St., New York 36, 1955.

This third volume of this series should meet with the same enthusiastic reception as its predecessors. In a little more than 300 pages it presents an authoritative review of the current events of medicine in each major subspecialty. There is usually sufficient editorial opinion by the respective experts to help orient the reader concerning the significance of specific procedures and therapies.

While certain sections of the book are more likely to be of interest to physiatrists than are others, almost every section of the book can be read with profit. The chapter on psychiatry contains comments on the relationship between the nursing staff and long-term patients which will interest many who are directing rehabilitation facilities. The discussions of cardiovascular disease, allergy, diabetes, diseases of the chest, endocrinology and new drugs should be of value to most physicians interested in physical medicine. The chapters on physical medicine by Drs. G. M. Martin and F. H. Krusen, on orthopedic surgery by Dr. F. R. Ober and on rheumatic diseases by Dr. E. W. Boland should prove particularly interesting. There is no separate chapter on rehabilitation or neurology this year.

This book should be read more with the objective of obtaining familiarity with the value of new drugs, such as chlorpromazine, acetazoleamide (diamox) and the newer antibiotics, or orientation in such interesting controversies as that over retrolental fibroplasia. Although not primarily a reference type of book, it would be improved (and not much lengthened) by presenting complete references for quoted articles, rather than journal, page and date only. The last chapter would benefit from a more complete list of references, particularly a few for the statements in the paragraph on physical therapy.

The book is interestingly written and informative and is heartily recommended.

DIFFERENTIAL DIAGNOSIS OF INTERNAL DISEASES: Clinical Analysis of Symptoms and Signs on Pathophysiologic Basis. By *Julius Bauer*, M.D. Leatherette. Price, $15.00. Second revised and enlarged edition. Pp. 987. Grune & Stratton, Inc., 381 Fourth Ave., New York 16, 1955.

This excellent and very practical text in differential diagnosis is now in its second edition. It stresses diagnosis by clinical means and in particular, the importance of and interpretation of history, physical findings, and personality in the individual clinical case. As such, attempts to present and emphasize the fine art of minute observation and thorough examination of the patient is noted throughout the text. The text, therefore, attempts to train and stimulate clinical thinking and judgment.

The text is divided into two parts, the first concerning leading symptoms and the second leading signs. In the former, some twelve chapters or divisions are concerned with such topics as headache, chest pain, abdominal pain, backache etc.; in the latter section of the text of leading signs the various organ systems are treated in a most adequate and interesting fashion.

The text is well written on excellent durable publishing and is most readable. It includes photographic illustrations of clinical cases, X-rays, and diagrams. Also very worthy

of note is the increased and adequate bibliography.

The text is very highly recommended to all physicians.

THE CLINICAL INTERVIEW: THERAPY. A Method of Teaching Sector Psychotherapy. Vol. II. By *Felix Deutsch*, M.D., and *William F. Murphy*, M.D. Cloth. Price, $7.50. Pp. 335. International Universities Press, Inc., 227 W. 13th St., New York 11, 1955.

This volume subtitled "A Method of Teaching Sector Therapy" follows a previous one on "Diagnosis—A Method of Teaching Associative Exploration." Both of the authors are experienced clinicians and teachers whose purpose is to provide psychiatric residents with a "guide for therapeutic interviews." To this end they have recorded verbatim the interviews with eight different patients and have analyzed the interviews by means of interspersed comments.

Although based strictly on psychoanalytic principles, the method of the goal-directed therapy described differs in many ways from psychoanalysis. One *sector*—a symptom or set of symptoms—is chosen for exploration, with an avoidance of problems not closely related to the selected area. The technic has as its goal "the adjustment of a patient within and to a given life situation to which he was not adjusted previously."

The difference between this method and psychoanalysis, as well as other therapeutic methods, is indicated repeatedly by the authors. Sector analysis is a technic regarded by them as less effective than is psychoanalysis, but is designed to help those patients for whom complete analysis is impossible because of lack of time or for other considerations.

While written principally for the teaching of psychiatric residents, this book has an interest for those concerned in any kind of therapy because of the considerable number of psychiatric patients who have as their presenting complaints symptoms which are somatic.

NEURO-RONTGENDIAGNOSTIK DES SCHADELS. By *H. Dietrich*, M.D. Cloth. Price, 28 marks. Pp. 184, with illustrations. Gustav Fischer, Villengang 2, Jena 15b Germany, 1954.

Based on a sound knowledge of both osteology and neurology, this excellent book gives the most significant findings in more than 50,000 patients whose craniums have been studied roentgenographically since 1927 in the neurological clinic of the University of Berlin at the Charite. Emphasis on on the 271 well-reproduced figures; the accompanying text is succinct. There is an index and a bibliography of reasonable length. This book is full of valuable information for neurologists and roentgenologists, plus enough surprising details about the bones of the head and diseases of the brain to make it especially interesting to medical students.

SHOULDER LESIONS. By *H. F. Moseley*, D.M., F.R.C.S., F.A.C.S. Cloth. Price, $12.00. Pp. 329, with illustrations. Paul B. Hoeber, Inc., 49 E. 33rd St., New York 16, 1953.

Readers of the "Archives" are probably all interested in publications hinging on information about diagnosis and treatment of shoulder lesions since physical methods are so frequently employed in treatment. This text is highly recommended for students in the field of Physical Medicine and in Orthopedics. The first chapter on anatomy is beautifully illustrated by diagrams and photographs eliminating unduly description. Clinical syndromes are then described again with unusually effective color drawings, charts, diagrams and good reproductions of photographs and x-rays, lavish in number.

These are good explanations of syndromes known to respond especially well or almost specifically to Physical Medicine procedures such as the "Cervico-dorsal, lower trapezius and superior scapular syndromes" and "Fibrositis."

A chapter is devoted to re-education exercises, again well illustrated, but no detail is included as to technical aspect of diathermy administration, although its value is recognized.

This book should be a part of all libraries for the specialist in Physical Medicine and in Orthopedics and as well as a valuable reference for the general practitioner.

NEUROSURGERY. An Historical Sketch. By *Gilbert Horrax*, M.D. Cloth. Price, $3.75. Pp. 142, with 69 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1952.

This is one of the monographs in the American Lecture Series and aims at providing an historical review of neurosurgery from earliest times down to the present day.

Dr. Horrax has interspersed interesting nuggets of new information throughout the book though in general he has leaned heavily on historical authorities. Portions of this work may appear cursory to the initiated reader, yet the author has done a competent job in compressing an enormous amount of material into very small confines. The last two chapters, dealing with the Pre-Horsley period (1846-1890), and the modern period (1890

—the present day) are more fully developed than the earlier portion.

The book is well planned, while the prose style is popular and succinct. It should be interesting not only to neurosurgeons, but to everyone interested in the history of medicine.

SLIPPED CAPITAL FEMORAL EPIPHYSIS. By *Armin Klein*, M.D., et al. Cloth. Price, $6.75. Pp. 130, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1953.

This is a monograph in American Lectures in Roentgen Diagnosis of the American Lecture Series. It describes the present technic used at the Massachusetts General Hospital in dealing with cases of slipped femoral epiphysis. A review of cases treated between 1903 and 1933 showed that, of all methods used, the best results were obtained in those fixed with a Smith-Petersen nail, while open reduction and nailing followed by plaster fixation showed poor results. Thereafter, the practice has been to mobilize the hip, nailed in situ, as soon after the operation as practicable, and best results have occurred in those cases nailed before the slip became marked.

In order to show the development of their technic, the authors have included several excerpts from previous publications with some fresh observations. The X-ray photograph reproductions are excellent. As a whole, the book is highly technical, and a significant contribution to our knowledge of the subject.

TEXTBOOK OF THE RHEUMATIC DISEASES. Edited by *W. S. C. Copeman*. Second edition. Cloth. Price, $11.00. Pp. 754, with 464 illustrations. The Williams & Wilkins Co., Mt. Royal and Guilford Aves., Baltimore 2, 1955.

The first edition of this book on rheumatic diseases appeared in 1948. Since that time interest in rheumatic diseases has increased, largely due to the discovery and use of cortisone and ACTH in rheumatic diseases.

The contributors to this volume are all English authorities on rheumatic diseases, radiology, physical medicine and orthopedics. The book is arranged in twenty-nine chapters which cover the various aspects of rheumatic diseases completely. Because a number of authors have contributed to this work, there is often overlapping of material, and at times inconsistencies in the details of handling the various types of arthritic diseases are apparent.

Kellgren has contributed a most interesting chapter on pain and its various mechanisms. Chapters are devoted to the anatomy and physiology of joints and to the relationship between physical environment and rheumatic diseases. A new section on the adrenal hormones includes a general summary of the development and use of steroids.

The chapter on physical medicine and rehabilitation was written by Hugh Burt. It outlines the basic physical procedures that are useful against various rheumatic diseases. Importance of the balance between rest and therapeutic exercises is emphasized. Burt emphasizes the need of home treatment and also describes some of the rehabilitation procedures that are applicable to the disabled arthritic. The use of pin-fire of the skin with an electric cautery to produce a counter-irritant effect is said to be useful for patients with large painful effusions of the knee and also for relieving pain in the small joints of the fingers and thumb. This method of treatment is relatively unknown in this country.

The section on the principles of orthopedic treatment by Watson-Jones and Osmond-Clarke views exercise conservatively, and emphasizes the importance of long-term bed rest and immobilization frequently in plaster beds, shells or plaster splints. Various surgical procedures that have been used for arthritic patients are carefully evaluated and described. Hydrotherapy and spa therapy are reviewed briefly.

This book is primarily a reference work for physicians interested in rheumatic diseases. Because of the overlapping of material and different viewpoints presented, the work is rather cumbersome as a textbook for students.

WIEDERHERSTELLUNG DER LEBENSTUCHTIGKEIT GESCHADIGTER MENSCHEN. Rehabilitation in inlandischer und auslandischer Sicht. By Dr. Med. Habil. *Hans Hoske*. Paper. Price, $3.80. Pp. 217 Georg Thieme Verlag, 14a, Stuttgart, Germany, 1955.

Thanks to the author's earnestness of purpose, his assimilation of an immense literature, his own direct experience with the work, an extraordinary store of factual information, and a remarkable compactness of style, this book does an outstanding job of reviewing the entire field of rehabilitation in 185 pages.

Introductory paragraphs give the reasons for his interest in this field. The German statistics are significant. The nation has about 1,500,000 persons disabled by World War II and about 500,000 persons disabled in the industries. The latter figure is increasing by at least 100,000 persons annually. The number of people receiving pensions as invalids is not available, but is known to be increasing by about 300,000 each year. The spectacular renascence since the war has been achieved in spite of the fact that one out of every three Germans is receiving some kind of "social" income. To keep this terrific burden from overwhelming the taxpayer, a large-scale program is needed to restore or main-

tain as much as possible of a sense of social responsibility in all handicapped people.

Succeeding pages take up the cost of rehabilitation programs, technical aspects of various rehabilitation procedures, the special problems of various handicaps (including chronic disease), the industrial, social, and administrative problems, and trends in the training of personnel and in research. There is also a review of the programs operating in various countries, particularly the United States.

Too few people will be able to read this book in German. It deserves translation into Interlingua, for without it no library on rehabilitation will be complete.

CLINICAL NEURO-SURGERY. Congress of Neurological Surgeons. Vol. 1. Cloth. Price, $8.00. Pp. 201, with illustrations. The Williams & Wilkins Co., Mt. Royal and Guilford Aves., Baltimore 2, 1955.

This book is announced as the first of a series of publications on the proceedings of the Congress of Neurological Surgeons. This particular volume records the proceedings of the Congress held in New Orleans in 1953.

The volume has been compiled by noted contributors having in mind an expressed, two-fold purpose; first, to honor one or more scientists in the field of the neurological sciences and to afford them opportunity to present some of their original studies. Secondly, to record for the future and for those not members of the Society, the valuable ideas of those men who have contributed to the success of the programs. Sir Geoffrey Jefferson, Emeritus Professor of Neurosurgery, University of Manchester, England, is so honored in this book and the first four chapters consist of original papers by this distinguished and world-famous author. The chapter, "Changing Views on the Integration of the Brain," is particularly significant and contributes much toward clarifying our present knowledge of this subject.

The panel discussions covering anatomy and physiology of the frontal lobe together with the panel "Psychosurgery: Indications and Sequelae" help the reader to organize his thinking in these spheres and provide current concepts on these important subjects. Stress factors are reviewed in terms of frontal lobe physiology providing additional revised psychological information on this topic. The text is liberally sprinkled with drawings, figures, x-ray reproductions and electroencephalographic tracings. A subject index assists the reader in organizing and studying the material.

The text has the usual weaknesses in composition and structure manifested when multiple contributors are working under the direction of an editorial board. These weaknesses include a variable style of writing and method of presentation which changes from author to author and section to section, making it somewhat difficult to follow the context. Author's references to previous literature are quoted and utilized in different ways. The organization of the text is by title, subject matter and author, rather than being a coherent, smooth-flowing text as a whole.

THE CLINICAL INTERVIEW. Vol. I: Diagnosis. A Method of Teaching Associative Exploration. By *Felix Deutsch*, M.D., and *William F. Murphy*, M.D. Cloth. Price, $10.00. Pp. 613. International Universities Press, Inc., 227 W. 13th St., New York, 1955.

This book outlines a method of arriving at a dynamic diagnosis of mental and psychosomatic disorders utilizing the psychoanalytic theory of the unconscious. In it is demonstrated a technic of guided free association which attempts to trace specific interrelations in depth and to elucidate structure of symptom formation. The technic is demonstrated by recording verbatim interviews of patients who illustrate different problems. This material is analyzed by the authors in such a manner as to show how they obtain pertinent information from the interview and at the same time effectively lead the patient to therapeutic insight. From this book the reader may study the method by which unconscious material is conveyed to psychiatric patients and learn considerable about the art of listening.

This book is written primarily for the teaching of psychiatric residents and for practising psychiatrists. It should also be useful to psychologists, medical (especially psychiatric) social workers and others interested in psychosomatic medicine.

PERIPHERAL VASCULAR DISEASES. By *Edgar V. Allen*, M.D.; *Nelson W. Barker*, M.D., and *Edgar A. Hines*, M.D. Second edition. Cloth. Price, $13.00. Pp. 825, with 316 illustrations. W. B. Saunders Company, West Washington Sq., Philadelphia 5, 1955.

This second edition of "Peripheral Vascular Diseases" has so many revisions of the first edition that it is almost a new book. The first three chapters are devoted to definitions, diagnosis, and research. Chapters IV to VII deal with the various vasospastic syndromes; chapters IX to XVII discuss organic diseases of the arteries; chapters XVIII to XX deal with arterio-venous fistulas, tumors, and purpura respectively; chapters XXI to XXIV consider diseases of veins. Chapter XXV discusses lymphedema. Medical treatment is taken up in chapter XXVI, and a complete discussion of surgical treatment comprises chapter XXVII. Photographs of physicians

and surgeons who have made outstanding contributions in the field are scattered throughout the book, mostly at the beginning of chapters. The book is well-written. There is good correlation between text and x-ray and microscopic findings. One notes with regret a few deficiencies which detract somewhat from an otherwise outstanding text. Only nine pages are devoted to a discussion of "Physical Measures designed to improve arterial circulation," and half of these include a discussion of typhoid vaccine, use of the oscillating bed, and anesthetization of sympathetic nerves. The matter of heat, direct and indirect, is barely touched upon. Iontophoresis with histamine or mecholyl is not mentioned. Similarly in the discussion of the prevention of venous thrombosis and pulmonary embolism, post-operatively, no mention is made of the use of sinusoidal stimulation of calf muscles. The word rehabilitation does not appear anywhere. In spite of these deficiencies, the book is highly recommended to physicians and students interested in peripheral vascular diseases.

CHANGING ATTITUDES TOWARDS THE DISABLED. Edited by *Norah Hill*, A.R.R.C. Proceedings of the Sixth World Congress of the International Society for the Welfare of Cripples. Cloth. Pp. 285, with illustrations. Central Council for the Care of Cripples, 34 Eccleston Sq., London, S.W. 1, England, 1955.

This is a compilation of papers presented at the Sixth World Congress of the International Society for the Welfare of Cripples held at The Hague, September 13-17, 1954, with the cooperation of the Netherlands Central Society for the Care of the Disabled.

The book represents the views and ideas of over one hundred speakers which cannot be summarized here. However, a perusal of the organization of the meetings gives a general impression of the broad range of material covered with all the related fields represented. The general theme of the Congress was: "Changing Attitudes in a Changing World." Under the general title of "Public Understanding and Support of Services for the Crippled," the various sections dealt with sub-topics as follows: Medical Section: "The Medical Profession and Rehabilitation Services," Social Section: "The Attitude of the Family and Community," Educational Section: "Special Schools for the Handicapped," Vocational Section: "Improving Attitudes towards the Employment of the Handicapped."

Special sessions dealt with specific problems such as cerebral palsy; amputees; rheumatism and arthritis; spinal paraplegia; and prostheses, braces, and technical aids. Considerable discussion was devoted to organizing services for the disabled on an international as well as a national level.

For the American who is interested in rehabilitation of the disabled this book is an excellent source on how the problems in this field are being considered and met in other countries.

PRINCIPLES OF INTERNAL MEDICINE. Edited by *T. R. Harrison; Raymond D. Adams*, et al. Second edition. Cloth. Price, $16.00. Pp. 1703, with illustrations. The Blakiston Company, Inc., 575 Madison Ave., New York 22, 1954.

The original purpose of this book was to achieve a balance between the art and the science of medicine. This purpose has been achieved even more effectively in the second edition than in the first, through extensive revision of the chapters dealing with the basic mechanisms of disease and of many of the portions devoted to specific diseases and disorders. The retention of the general arrangement gives a logical succession of discussions; first, of the cardinal manifestations of disease and the basic mechanisms, then a consideration of specific disease processes. Several new features have been added, including essays on the relations of the patient to his environment, to his physician, and of the latter to the patient as an individual. Sections on alcoholism, electromyography and congenital heart disease are new and pertinent.

Contributors have been selected as authorities in their fields, and their contributions are factual, up-to-date, and almost too concise, but useful for this very reason. The preservation of the original approach in a large initial section devoted to the fundamental concepts of disease clarifies much of the succeeding material, and avoids repetition which clutters many otherwise fine but more traditional texts of internal medicine. The discussions of disease entities in the latter parts of the book refer back to those fundamentals of physiology, biology and chemistry in the first third of the text, thus giving an excellent approach to concepts of pathological change and at the same time shortening the text.

Typography and lighter paper have been chosen to supply a most readable book within a reasonable bulk. The reviewer has found this edition of Harrison useful as a daily reference, done in clear, concise language.

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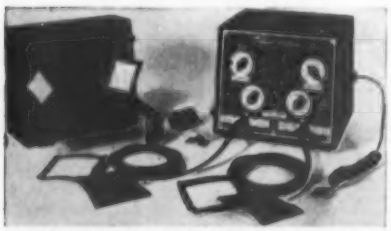

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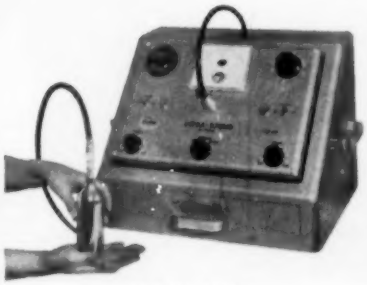

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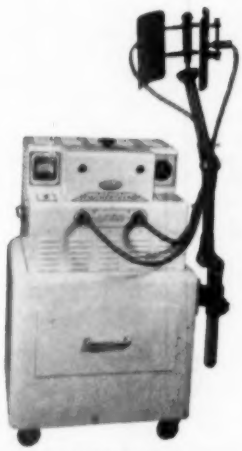

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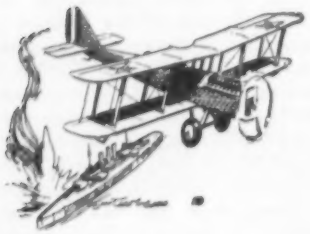

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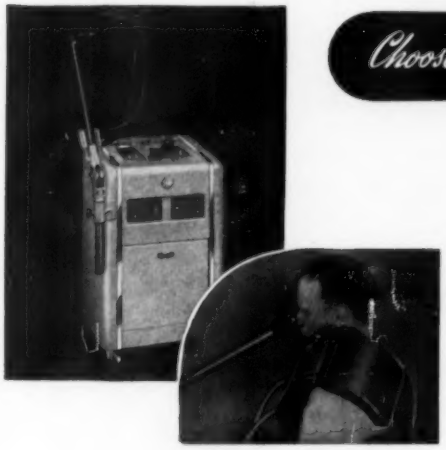

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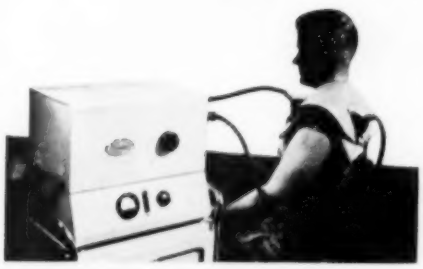

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